MONTANA'S KIDS, CRITTERS, & COMMODITIES

RESOURCE GUIDE FOR TEACHERS

LESSONS AND ACTIVITIES FOR GRADES K-3

These materials have been developed by Agriculture In Montana Schools. This has been designed to provide you with ideas and materials which facilitate integration of agricultural concepts into your classroom lessons and provide many hands-on activities to encourage learning. These lessons have been aligned to the Montana Content Standards. Contents may be reproduced for classroom use and other educational programs.

March 2006

Dear Teacher:

Montana's Kids, Critters & Commodities Resource Guide for Teachers will give you the tools to explore the wonders of Montana's agriculture with your students. We have developed some fun hands-on lessons and activities to encourage learning about food and fiber. The lessons will help you to teach the importance of agriculture to their lives. Many do not realize the health, economic and social impact of agriculture, or even understand what agriculture really is.

Definition from Webster's New World Dictionary:

- Agriculture: the science and art of farming; work of cultivating the soil; producing crops and raising livestock.
- Agri: meaning food, meaning any substance taken into and assimilated by a plant or animal to keep it alive and enable it to grow.
- Culture: 1. the cultivation of soil; 2. the raising, improvement or development of some plant, animal or product.

Agriculture is everywhere! It is the wheat that becomes toast for breakfast, the wool that becomes a sweater to wear and the tree that becomes paper to write on and boards to build a house. It is the miracles of life! Agriculture is the science of the food and fiber system. This Resource Guide can be used in your classroom in math, history, geography, science, social studies, art, music, language, and nutrition. Agriculture is Montana's number one industry. One in five Montana jobs is agriculture related.

Using agriculture as a tool to integrate and connect learning can motivate students and provide them a greater understanding of what agriculture does for them, their family, their school, their community, and their world.

Margie Thompson
Agriculture in Montana Schools President

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HOW TO USE THIS GUIDE

Overview:

This guide contains information and activities to help teachers acquaint students with Montana agriculture.

Objective:

Students will be exposed to information concerning various aspects of Montana agriculture.

Keywords:

Many terms used in the lesson may need explanation or definition.

Brief Description:

Each lesson includes background information for the teacher in preparing a class presentation or discussion.

Lesson:

Complete instructions are listed, including a list of necessary materials, procedures, activities, and discussion questions. These are detailed as teacher-led activities to be presented to a group of students.

Student activities can be adjusted as appropriate for the age and grade level. Some of the lessons can be presented as a demonstration rather than a group hands-on activity. There are worksheet masters designed for student use, as homework, quizzes, or individual assignments.

Assessment:

These sections contain information that the students should understand by the end of the lesson. It also includes any additional materials, activities, and resources pertaining to the current lesson.

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MONTANA'S AGRICULTURE

Agriculture is Montana's number one industry. There are many different types of products grown throughout the state. Montana is divided into 56 counties with a variety of climates. Each county generates a variety of products. What does your county produce?

Agriculture is an important part of your life. You eat, wear, or use some type of agricultural product each day. You cannot live without agriculture! What have you used or eaten today that comes from agriculture?


Crops

BEANS-BEANS EVERYWHERE!

Grades: K-3
Subjects: Literature, Science, Reading, Writing
Montana Standards: Literature1-5, Science1-5, Reading 1
Approximate Time: 2-30 minute classes & ongoing

Objectives: Students will

- Have a knowledge base of plant life and how beans grow.
- Practice creative writing based on knowledge and imagination.
- Sample Montana "Cowboy Beans"

Materials Needed:

- *Jack and the Beanstock* by Paul Galdone (or other author)
- Lima beans
- Potting soil
- Resealable bags
- Writing paper and pencils
- "Cowboy Beans" recipe
- 2 pounds pinto beans
- 2 pounds ham hock
- 2 onions, chopped
- 4 Tablespoons sugar
- 2 green chilies (or to taste)
- 1 can tomato paste

Keywords:

Dry beans, Lentils, rotation, climate, garbanzo beans, pinto beans

Brief Description:

Beans are one of the crops grown in Montana. The south central and eastern parts of Montana have the best climate for growing beans. Of the beans grown in Montana, Garbanzo ranks 3rd in the nation, Lentils - 4th in the nation, Dry Edible Peas - 4th in the nation, and the most common is Pinto Beans - which ranks 7th in the nation in production.

In 2002, 13,500 acres of pinto beans were planted in Montana. When beans are grown, especially pinto, good irrigation is necessary. Most farmers grow at least two types of crops, so they are able to rotate crops each year. (Crop rotation is alternately planting a crop each year, which helps in soil revitalization.) Common rotated crops are mustard, peas, lentils, pinto beans, barley and canola. The peas use less moisture than wheat, and they also fix nitrogen from the air, which becomes available the following year to the next crop. Rotation with legumes reduces costs by eliminating the need to add nitrogen to the soil.

Lesson:

1. Read and discuss the story Jack and the Beanstock
2. Discuss what plants need in order to grow.
3. Introduce students to beans in Montana.
4. Have students plant a lima bean in a resealable bag filled with soil.

5. Based on the story Jack and the Beanstock, have the students use their imagination and write one sentence about how their beans will grow (tall, fast, enormous, etc.) Give them the sentence starter "My bean will grow…"
6. At a science area, plant and label beans growing under a variety of conditions such as, no light, no soil, no water, light only, etc.
7. Ask groups of students to keep written observations of different growing conditions. Ask students to write a short paragraph on the results of their plant growth.
8. Make and sample "Cowboy Beans."

Discussion Questions:

1. What environmental conditions do most plants need to grow?
2. What would you like your plant to grow into?
3. What do most plants need to grow?
4. Do you think all seeds need the same conditions to grow into a healthy plant? Why or why not?
5. How can we improve the conditions so that plants have a better growing environment?

Related Activities:

1. Read related books about how plants grow. (The Tiny Seed, From Seed to Plant)
2. Look at the part of a bean plant under a microscope.
3. Draw and label the parts of a plant.
4. Plant a variety of seeds and chart the similarities and differences.

Cowboy Beans

(* recipe of cook John White of the N Bar Ranch in Montana. This was one of the cowboy's favorite dishes)

2 pounds pinto beans
2 pounds ham hock
2 onions, shopped
4 tablespoons sugar
2 green chilies (or to taste)
1 can tomato paste

Wash the beans and soak over night. Drain, place in a Dutch oven and cover with cold water. Add remaining ingredients and simmer until tender. Sample the beans while cooking. Add salt to taste and water as needed.

THE WONDERFUL WORLD OF CHERRIES

Grades: K-3
Subjects: Science , Music, and Art
Montana Standards: Science 1-5, Art 1, Music 1
Approximate Time: 45-60 minutes

Objectives: Students will

- of the nutrients in cherries
- of how cherries are used
- of a cherry tree through the seasons

Materials Needed:

- Cherry Tree drawing
- leaves & blossoms graphics
- color crayons or markers
- popcorn
- red powdered Tempera paint
- Elmer's school glue
- Popcorn Popping song

Keywords:

cherry, seed, pit, sweet, tart, Flathead Valley, Flathead Lake, scald, potassium, dormant

Brief Description:

What is a cherry? A cherry is a red or yellow fruit. It has a seed called a pit and grows on Cherry trees. Cherry trees take up to six years to mature enough to produce a crop. A six-year old tree will produce 300 pounds of cherries. Royal Anne, Vann's, Bing's, Lamberts, Lapin's and Rainer's are some sweet cherry varieties. Most sweet cherries are sold fresh during the summer months. Tart cherries are also grown in Montana, but are canned or dried. Tart cherries are used mostly in pies, but sweet cherries can also be used.

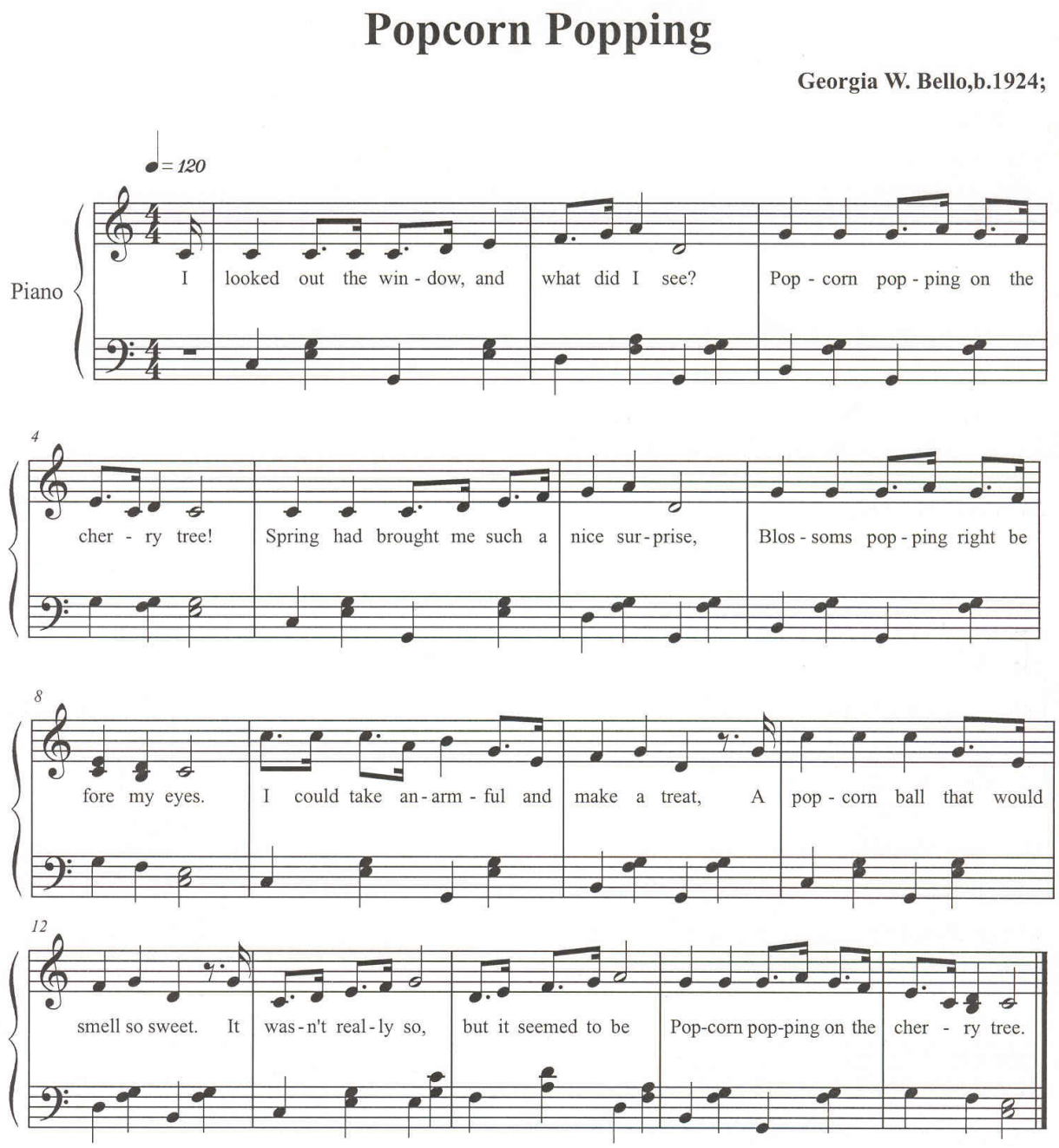
In Montana's Flathead Valley, cherries grow along the east side of the Flathead Lake. The lake has a moderating influence on the climate; this keeps the temperatures in this area mild. The ideal conditions when raising cherries would be to have at least 135 frost-free days and a limited amount of heat and rain. The heat can scald the cherries and leave bad spots; the rain acts like hail, it can split the skin of the cherries leaving a small sore. The soil surrounding the lake is very rocky and provides a perfect environment for the root systems of the cherry trees.

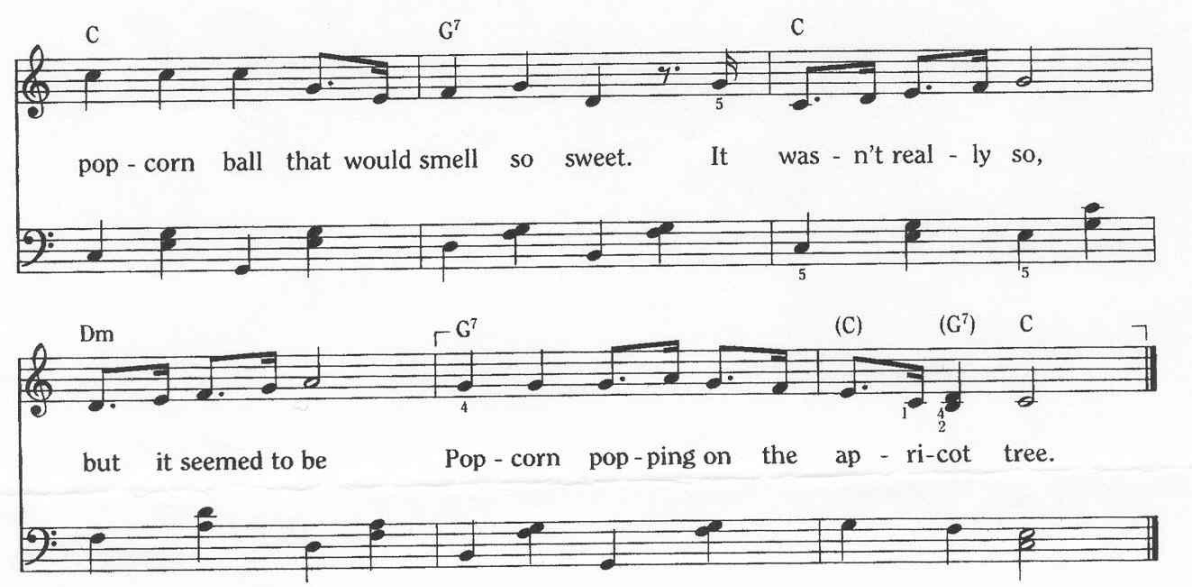
Cherries are low in calorie, fat and sodium. Cherries are a good source of potassium, fiber, Vitamin C, Vitamin B complex and other minerals.

The cherry tree goes through many changes in a year. In the winter, the cherry tree is just a trunk and branches. It is dormant, which means it is sleeping. When the weather warms up in the spring, buds begin to show and grow into new branches. Blossoms form on the branches and leave a wondrous fragrance. When the petals break away from the blossoms, they leave behind green buds that will eventually ripen into cherries. The fruit grows slowly over the next six to eight weeks. The cherries remain green until late June. They fill and ripen in the summer season and are ready to be harvested. Some cherry orchards allow people to pick their own cherries and others use machinery and sell them to stores. The first frost brings signs of fall. The leaves change color and fall off the tree. It begins again with the cherry tree as just a trunk and branches.

Lesson:

1. Have students learn the Popcorn Popping song, so as they work they can sing.
2. Photocopy enough of the Cherry Tree drawing for all students.
3. Have students color leaves and blossoms for the appropriate seasons.
4. Need to have enough white popped popcorn for each student as cherries.
5. Add popped popcorn to a clear plastic bag with Tempura powder and shake to color popcorn.
6. Have students decorate a cherry tree for each season.(Winter, Spring, Summer, Fall) Use the Tempura popcorn for the ripe cherries. Caution the students not to eat the colored popcorn. NOTE: Could also have dried cherries on hand for a snack.

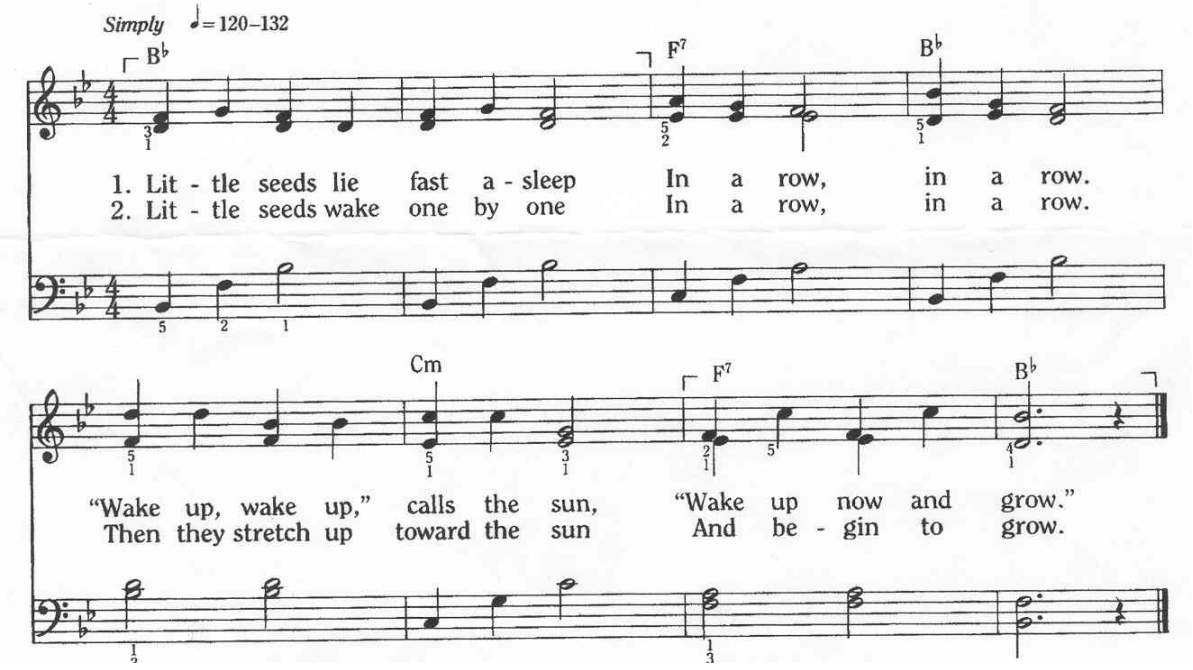


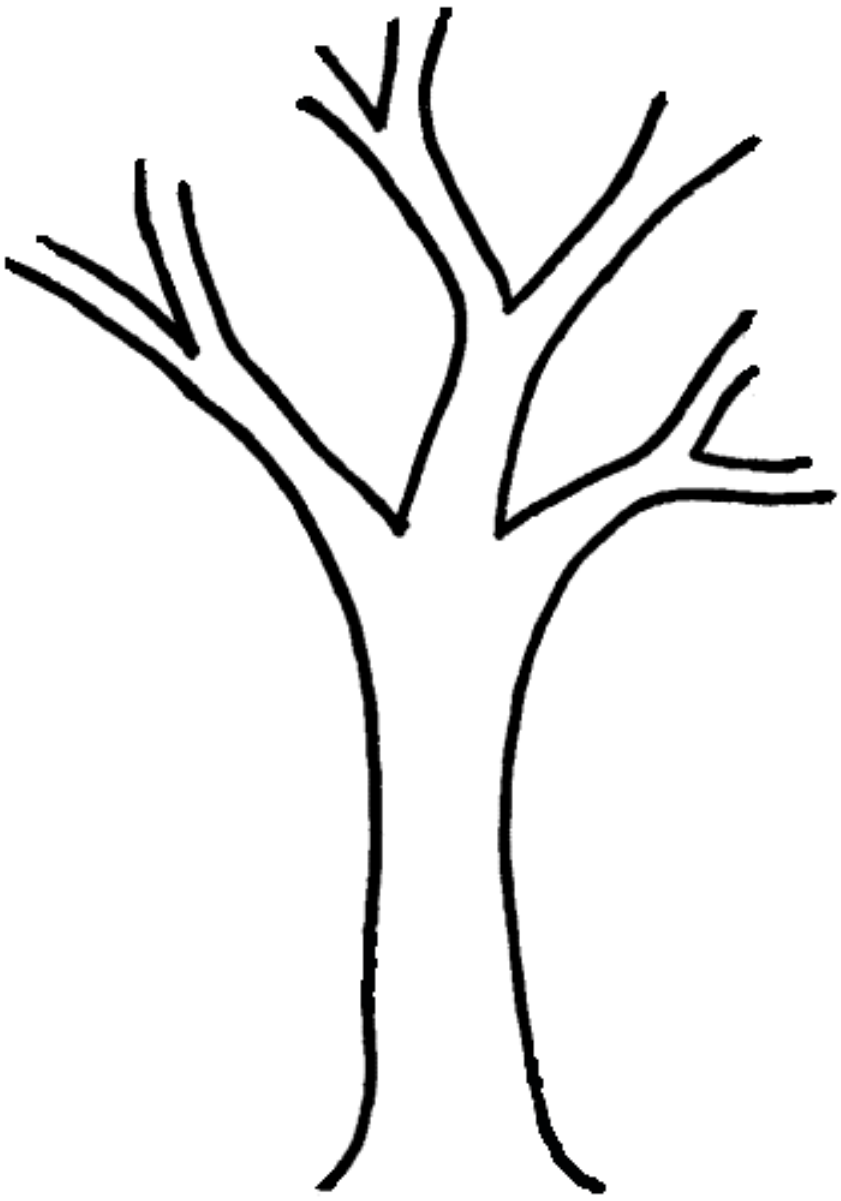


Improvise actions as suggested by the words.

Words: Georgia W. Bello, b. 1924. © 1957 LDS
Music: Georgia W. Bello, b. 1924; arr. by Betty Lou Cooney, b. 1924. © 1957, 1989 LDS

Little Seeds Lie Fast Asleep





GROWING A CHERRY TREE

Grades: K-3
Subjects: Science, Math, and Art
Montana Standards: Science 1-5, Math 1-3, Art 1
Approximate Time: 60 minutes

Objectives: Students will

- of the age of a tree
- of how the weather effects cherries

Materials Needed:

- Tree cookies
- Sandpaper
- Vegetable Oil
- 3x5 index cards
- magnifying glass
- color crayons or markers
- yarn

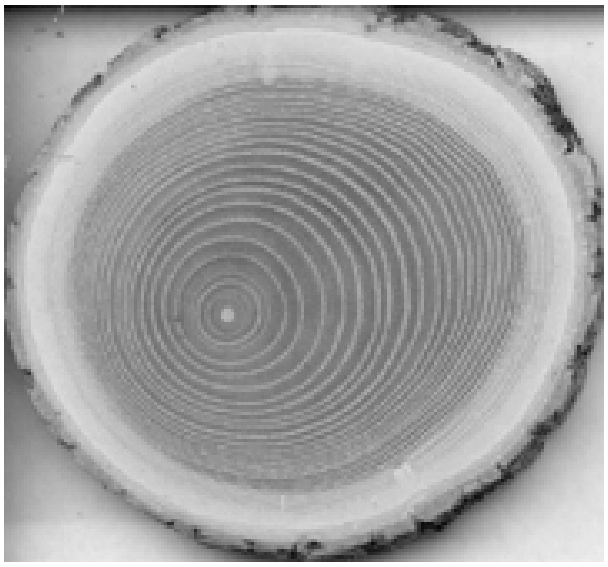
Keywords:

Flathead Valley, Flathead Lake, temperatures, scald, precipitation, drought, terrain

Brief Description:

In Montana's Flathead Valley, cherries grow along the east side of the Flathead Lake. The lake has a moderating influence on the climate; this keeps the temperatures in this area mild. The ideal conditions when raising cherries would be to have at least 135 frost-free days and a limited amount of heat and rain. The heat can scald the cherries and leave bad spots; the rain acts like hail, it can split the skin of the cherries leaving a small sore. The soil surrounding the lake is very rocky and provides a perfect environment for the root systems of the cherry trees.

Cherry trees grow in diameter by producing new wood in the layer just beneath their bark. The width of a given ring reflects the tree's growth rate in a particular year. The growth rate depends largely on precipitation during the growing season. Drought, disease, insects, fire and terrain affect the growth cycle of all trees.



*Lesson: (*Older students will be able to complete this activity. Younger students will be able to do items 1-6 and 9-10.)

1. Before the students' activity begins, have tree cookies cut out of a medium size log at about ½ inch thickness.
2. Explain to students that like them, trees also have an age. People have birthdays to tell their age, trees have rings to tell their age. Trees also have ways of showing factors that have influenced the trees' growth, such as moisture, drought, rot, broken branches, scaring, insects, and fire.
3. Have the students select a tree cookie, a piece of sand paper, vegetable oil and a magnifying glass.
4. The students will count the dark rings by sanding one side of the tree cookie and rubbing a few drops of oil over the sanded surface.
5. The students will look through their magnifying glass to count the number of dark rings.
6. On their index card, report the number of rings their tree has at the top of the card.
7. On the board, write one each of the following categories to create a graph. (You may have to add categories depending on the tree cookies.)
   1-6, 7-13,14-20,21-27, 28-34, 35-41, 42-48, 49-55, 56-60, 61-67, 68-74
8. Tape the index cards that the students have filed out about the category they fall into.
9. Drill a hole into each tree cookie and string with a piece of yarn for a necklace.
10. Have students color on them and write their name on their tree cookie.

Assessment: Have the students discuss whether the rings are all spaced evenly in their tree cookie. Are the rings equal or unequal? What could cause this to happen?

AN EVERGREEN SOLSTICE

Grades: 2-3
Subjects: Math, Language Arts, Social Studies, Science
Montana Standards: Science 3-5, Social Studies 3-6, Math 5, Writing 1, Art 1
Approximate Time: 1 hour

Objectives: Students will

- Learn about the winter solstice and how it takes place.
- Construct a simple pinhole viewer.
- Understand why the evergreen tree was selected for the celebration of Christmas.
- Understand why all of this is linked together.

Materials Needed:

- Activity Sheet
- Piece of paper
- Two white paper plates
- Holiday decorations
- Glue
- Sweet tarts candies-1 for each student
- http://www.realchristmastrees.org/types.html

Keywords:

Christmas, eclipse, solstice, winter, evergreen, lunar, dormant, hemisphere, tilt, axis, planet, distance, tradition, ritual

Brief Description:

Because of the tilt, as the Earth makes its yearly orbit around the sun, different parts of the Earth get different amounts of sunlight. December 21 or 22 is the day of the year that the Northern Hemisphere gets the fewest hours of sunlight. This shortest day—and longest night—is the winter solstice. The evergreen tree was selected as the Christmas tree for this reason. It was the only tree that did not look dead or dormant during that time of year. The evergreen tree celebrated life during the gloomiest time of the year.

Lesson:

1. Explain to the students about the winter solstice.
2. Give out a sweet tart to each student.
3. Have the students hold them up at arm's length away.
4. Have the students hold their thumb on the half of the sweet tart, and then have them close one eye. Move their thumb closer to their eye till it covers their eye.
5. Distribute the activity sheet. Read through the directions. Some students may point out that they would prefer to cut and paste on Step One. You may choose to do that, but there is the possibility that they will learn more by copying the instructions.
6. Model using the pinhole camera outside. Sometimes it is tricky to find the sun. DO NOT LOOK DIRECTLY INTO THE SUN!!
7. Let students know that the image of the sun with the pinhole camera will be small. The distance between the camera plate and the screen plate is called the throw distance. The throw distance in feet, divided by 9, gives the image in inches. That means if there is nine feet between the two plates, the image will be one inch across. Sunspots might look like a fleck in the screen material.
8. When the students are finished, you might want to pair them up and practice with their pinhole cameras on the playground before wrapping them.

9. Explain to them about what the ancient people though was happening during the winter solstice and how they celebrated during this time of year. May even read this brief explanation.

   Many ancient people believed that the sun was a god and that winter came every year because the sun god had become sick and weak. The ancient Egyptians brought green palm branches into their homes on the winter solstice as a symbol of life's triumph over death. The Romans also decorated with evergreens during Saturnalia, a winter festival in honor of their god of agriculture. The Saturnalia was a special time of peace and equality when wars could not be declared or fought. The Romans knew that the solstice meant that soon farms and orchards would be green and fruitful again. Centuries ago in Great Britain, woods priests called Druids used evergreens during mysterious winter solstice rituals. The Druids used holly and mistletoe as symbols of eternal life, and place evergreen branches over doors to keep away evil spirits. Later in the middle ages, Germans and Scandinavians placed evergreen trees inside their homes or just outside their doors to show their hope in the forthcoming spring. Our modern Christmas tree evolved from these early traditions.

10. What kind of evergreen trees are there? There are many, but what specific kinds are used as Christmas trees? The below is a list of some Christmas tree species or types that are sold and grown in the United States. What kind of tree would you pick? What kind do you think are grown specifically in Montana?

Assessment:

Students should have followed the directions on the activity sheet for make the pinhole camera and use it correctly. Understand what the winter solstice is and how ancient people celebrated it. The students should understand that there are a variety of Christmas trees. For older students have them look up each tree to see what it looks like. For younger students have them draw and color what their Christmas tree would look like.

Types of Christmas Trees

Deodara Cedar – *Cedrus deodara* – short, bluish-green needles; branches become pendulous at the tips; native to Himalayas; Deodara wood in Asia was used to build temples. In ancient Egypt Dedodara wood was used to make coffins for mummies.

Eastern Red Cedar – *Junirperus viginiana* – leaves are a dark, shiny, green color; sticky to the touch; good scent; can dry out quickly; may last just 2-3 weeks; a southern Christmas tree.

Leland Cypress – *Cupress ocyparis leylandii* – foliage is dark green to gray color; has upright branches with a feathery appearance; has a light scent; good for people with allergies to other Christmas tree types. One of the most sought after Christmas trees in the Southeastern United States.

Balsam Fir – *Abies balsamea* – ¾" to 1 ½" short, flat, long lasting needles that are rounded at the tip; nice, dark green color with silvery cast and fragrant. Named for the balsam or resin found in blisters on bark. Resin is used to make microscope slides and was sold like chewing gum; used to treat wounds in Civil War.

Douglas Fir – *Pseudotsuga menziesii* – good fragrance; holds blue to dark green; 1" to 1 ½" needles; needles have one of the best aromas among Christmas trees when crushed. Named after David Douglas who studied the tree in the 1800's; good conical shape; can live for a thousand years.

Fraser Fir – *Abies fraseri* – dark green, flattened needles; ½ to 1 inch long; good needle retention; nice scent; pyramid-shaped strong branches which turn upward. Named for a botanist, John Fraser, who explored the southern Appalachians in the late 1700's.

Grand Fir – *Adies grandis* – shiny, dark green needles about 1" – 1 1/2 " long; the needles when crushed, give off a citrusy smell.

Noble Fir – *Abies procera* – one inch long, bluish-green needles with a silvery appearance; has short, stiff branches; great for heavier ornaments; keeps well; is used to make wreaths, door swags and garland.

White Fir or Concolor Fir – *Abies concolor* – blue-green needles are ½ to ½ inches long; nice shape and good aroma, a citrus scent; good needle retention. In nature can live to 350 years.

Afghan Pine – *Pinus oldarica* – soft, short needles with sturdy branches; open appearance; mild fragrance; keeps well; grown in Texas; native to Afghanistan, Russia & Paskistan.

Austrian Pine – *Pinus nigra* – dark green needles, 4 to 6 inches long; retains needles well; moderate fragrance.

Red Pine – *Pinus resinosa* – dark green needles 4"-6" long; big and bushy.

Ponderosa Pine – *Pinus ponderosa* – needles lighter colored than Austrian Pine; good needle retention; needles 5" – 10" long.

Scotch Pine – *Pinus sylvestris* – most common Christmas tree; stiff branches; stiff, dark green needles one inch long; holds needles for four weeks; needles will stay on even when dry; has open appearance and more room for ornaments; keeps aroma throughout the season; introduced into United States by European settlers.

Virginia Pine – *Pinus virginiana* – dark green needles are 1 ½" – 3" long in twisted pairs; strong branches enabling it to hold heavy ornaments; strong aromatic pine scent; a popular southern Christmas tree.

White Pine – *Pinus strobus* – soft, blue-green needles, 2 to 5 inches long in bundles of five; retains needles throughout the holiday season; very full appearance; little or no fragrance; less allergic reactions as compared to more fragrant trees. Largest pine in United States; state tree of Michigan & Maine; slender branches will support fewer and smaller decorations as compared to Scotch pine. It's wood is used in cabinets, interior finish and carving. Native Americans used the inner bark as food. Early colonists used the inner bark to make cough medicine.

Carolina Sapphire - *Cupressus arizonica var. glabra* – 'Carolina Sapphire'- steely, blue needles; dense, lacy foliage; yellow flowers and nice scent; smells like a cross between lemon and mint.

Black Hills Spruce - *Pinus glauca var.densata* – green to blue-green needles; 1/3" to ¼" long; stiff needles may be difficult to handle for small children.

Blue Spruce – *Picea pungens* – dark green to powdery blue; very stiff needles, ¾" to 1 ½" long; good form; will drop needles in a warm room; symmetrical; but is best among species for needle retention; branches are stiff and will support many heavy decorations. State tree of Utah & Colorado. Can live in nature 600-800 years.

Norway Spruce – *Picea abies* – needles ½" – 1" long and shiny, dark green. Needle retention is poor without proper care; strong fragrance; nice conical shape. Very popular in Europe.

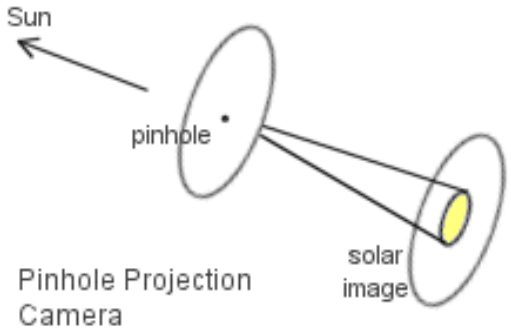
White Spruce – Picea glauca – needles ½ to ¾ inch long; green to bluish-green, short, stiff needles; crushed needles have an unpleasant odor; good needle retention. State tree of South Dakota.

Name: _____

Date: _____

Festive Eclipse Pinhole Viewer

You can make a holiday pinhole viewer so that you and other members of your family can safely watch the solar eclipse.



What you will need:

- Two white paper plates
- A piece of paper
- Holiday decorations
- Glue

What you need to do:

Step One

Neatly copy these directions for using a solar viewer on the back of one of the plates.

Your Eclipse Solar Viewer

Warning: Do not look directly at the sun! You can damage you eyes forever!

Take the plate with the small hole (the camera plate) and hold it up toward the Sun. Have a friend hold the other plate (your screen). Without looking at the Sun, move the camera plate until you get an image of the Sun on the screen plate. This may take some practice and patience. When the light on the plate gets very bright, you have captured the Sun's image. To get it focused, your friend needs to try moving the screen closer and farther away from you.

Step Two

Make the camera plate. With a pen or pencil tip make a small hole in the center of the plate. You are now finished except for the decorations!

Step Three

Make the screen plate. Decorate the rim but be sure not to cover the hole. Make sure that someone can hold on to the plate. Be sure to leave the flat part white.

Step Four

Carefully wrap and label your gift.

PINECONE ORNAMENTS

Grades: K-3
Subjects: Art, Social Studies, and Language Arts
Montana Standards: Social Studies 4 & 6, Writing 1, Reading 1, Art 1
Time: 30 minutes

Objectives: Students will

- Decorate a pinecone to hang on the Christmas tree.
- Understand that long ago ornaments were not bought but made.
- Students will write about what kind of rituals or traditions they do at their house at Christmas time.

Materials Needed:

- Pinecones
- Glue Gun
- Sequins
- String or ribbon
- Green paint in a bowl
- Small amount of garland, any color
- Hairspray

Keywords:

Pinecone, decorate, ritual, Christmas, ornament, tradition

Brief Description:

Students will make a pinecone ornament to hang on a Christmas tree. Evergreens were used to decorate homes (wreaths of holly, mistletoe, and pine) because the green showed that they were living when all other plants seemed dead.

The first decorated tree was at Riga in Latvia, in 1510. In the early 16th century, Martin Luther is said to have decorated a small Christmas tree with candles, to show his children how the stars twinkled through the dark night.

Until the mid 1800's Christmas trees were decorated with Christmas ornament that were edibles such as cookies, chains of popcorn, raisins, nuts, and pretzels. The tops of Christmas trees held flags, angels, or stars above the Christmas ornaments. The 19th century toys, bells, garlands, and paper Christmas ornaments were included as decorations.

Germany provided the world with the bulk of its unique Christmas ornament production. Nuremberg in Bavaria produced metal Christmas ornaments for export. Unique Christmas ornaments such as butterflies, stars, miniature musical instruments, and icicles of silver foil were among the Christmas ornaments to be produced. Dresden and Leipzig Germany produced embossed paper Christmas ornaments or cardboard Christmas ornaments known as Dresden's and angel hair. From the Thuringian mountains and Lauscha in Eastern Germany the creation of delicate blown glass Christmas ornaments began.

The glass pickle Christmas ornaments are the oddest German Christmas ornaments of all. For those who know the pickle Christmas ornament story and for those who participate in hanging the pickle Christmas ornament, solves the dilemma of who gets to unwrap gifts first. The glass pickle Christmas ornament is always the last Christmas ornament to be hung on the Christmas tree. The parents would carefully hide the unique Christmas ornament pickle in the Christmas tree among the other Christmas ornaments. When the children were allowed to view the Christmas tree decorated with Christmas ornaments, they would begin gleefully searching among the Christmas ornaments for the Pickle Christmas ornament. The children knew that whoever found the pickle Christmas ornament first would receive an extra little gift and would begin the unwrapping of the

Christmas gifts. The pickle Christmas ornaments and the other German glass ornaments have become keepsake ornaments that will be handed down to future generations.

Lesson:

1. Have the student's research and discuss what people did long ago when they decorated their Christmas trees. People long ago usually made their ornaments, what did they use? How is it different from today? Why do we put ornaments on the Christmas tree?
2. Take the pinecone and dip them in the green paint.
3. After it is dry let students glue the sequins on it.
4. Put little spots of glue to stick small piece of garland to the pinecone.
5. Once the glue has dried for a short time, take six inches of the string or ribbon and tie it to the top of the pinecone so it can hang from the tree.
6. Let completely dry and spray with hairspray to keep it together.
7. Have the students write a paragraph about a ritual or tradition that their family does at Christmas time. Is there a specific time that they get a Christmas tree? Do the children of the family always decorate the tree? Does everyone get to open one present on Christmas Eve?

Assessment:

Students should understand the history behind the ornaments on the Christmas tree. The Solstice Evergreen by Sheryl A. Kasas may be a good resource for the students to use as they research. Complete the pinecone ornament and paragraph about their families Christmas traditions. Lower grades you may want to read them a story and then do the pinecone ornament.

COUNTING CHRISTMAS TREES

Grades: 2-3
Subjects: Math and Language Arts
Montana Standards: Math 4-7, Writing 1, Technology 1-3
Approximate Time: 45 minutes

Objectives: Students will

- Study the table showing total Christmas tree sales between 1990 and 2002.
- Study the table showing the percent of people who have real and artificial Christmas trees.
- Take their own survey to learn how many of their classmates' families have real trees and how many have artificial trees.
- Compare the data they collect to national data, using the Internet website for up-to-date statistics.

Materials Needed:

- Computer with Internet Access, National Christmas Tree Association Industry Statistics Web site: www.realchristmastrees.org/industry
- Christmas Tree Sales Worksheet
- Colored pencils
- Graphing paper

Keywords:

data, graph, Christmas, tree, sales, survey, percent, prediction

Brief Description:

Students answer questions about a simple line graph that shows total Christmas tree sales from 1990 to 2002.

Lesson:

1. Provide students with the Christmas tree sales worksheet.
2. The worksheet provides a table showing Christmas tree sales from 1990 to 2002. Students study the worksheet, create a graph, and answer the questions.
3. This worksheet can be used as a homework assignment to be corrected in class, or as a classroom activity.
4. Conduct a survey of students to learn which of their families have real, artificial, and no trees. Then have students create a bar graph showing the information about household use of Christmas trees. The information shows the percent of homes that had real, artificial, and no tree in 2002. Why is the number of real trees in the households decreasing?

   Real tree- 21%; Artificial tree- 48%; No tree- 32%

   Make sure that they illustrate the results of their own survey accurately.
5. Have students write a paragraph explaining how the data they collected compare to the national data.

Assessment:

Lower grade students may only conduct the survey, cut out little trees and make a picture graph. Upper grade students will score at least 80% on the worksheet and paragraph comparing their data and national data. If students are more advanced additional questions can be added. In how many years on the graph did sales decline from the previous year? If the average Christmas tree sold for $35 in 2000, how much total income did Christmas tree sales produce that year? Between which two years on the graph did the biggest gain in sales of Christmas trees occur, and what percent increase was that?

Answer Key:

2. 32 million 3. 1993 4. 1991, 1995 5. 4 million 6. Up 7. 117,500,797 8. Down

NAME: _____

U.S. CHRISTMAS TREE SALES WORKSHEET

Use the information provided in the table to answer the following questions.

		% OF KINDS OF TREES IN HOUSEHOLDS		
YEAR	TOTAL TREES SOLD	REAL TREE	ARTIFICIAL TREE	NO TREE
1990	35,376,404	38%	39%	23%
1991	36,970,932	39%	41%	20%
1992	34,367,151	37%	41%	22%
1993	35,244,264	36%	43%	20%
1994	33,016,060	34%	42%	24%
1995	37,154,290	37%	40%	23%
1996	31,676,800	32%	40%	28%
1998	32,181,594	35%	41%	23%
1999	35,364,350	35%	44%	20%
2000	32,006,247	31%	49%	21%
2001	27,800,000	24%	52%	23%
2002	22,330,200	21%	48%	32%

1. Create a bar graph using the information from the table above showing every year and how many trees were sold.
2. How many millions of Christmas trees were sold in the year 2000? _____
3. Were more Christmas trees sold in 1993 or 1994? _____
4. About 35 million Christmas trees were sold in 1990, 1993 and 1999. Which years were sales higher? _____
5. Christmas tree sales increased between 1994 and 1995. How many more millions of trees were sold in 1995 than in 1994? _____
6. In 1996, about 31 million Christmas trees were sold. Did sales the following year go up or down? _____
7. How many trees were sold in all from 1999 to 2002? _____
8. Looking at the graph you have made of total trees sold over the years what is your prediction of Christmas tree sales for the 2003, up or down? _____

FINGER LEAF PRINTS

Grades: K-3
Subjects: Art, Language Arts, Math, and Science
Montana Standards: Science 3, Math 4 & 7, Reading 1, Art 1 & 4
Time: 45 minutes, collecting of leaves not included (Lesson can only be completed in Fall)

Objectives: Students will

- Talk about the different textures of the leaves, how they look and feel.
- Sort the leaves by size, shape, and color.
- Explore the different trees that the leaves came from.
- Compare each finger paint leaf print to other classmates.

Materials Needed:

- Wide assortment of leaves
- Finger paint
- Newspapers
- White paper

Keywords:

Leaf, tree, texture, veins, characteristics, pattern, sort

Brief Description:

Students will take a walk outside to collect leaves that have recently fallen. Upon returning to your classroom, talk about how they look and feel. Invite the students to compare the leaves and sort them by size, shape, and color. Talk about the different types of trees that the leaves have fallen from. Before the students make their finger paintings, have them explore the slippery texture of the finger paint.

Lesson:

1. Ask each student to find the bumpy side of a leaf, the side with the raised veins.
2. Show the students how they can use their fingers to spread a thin layer of finger paint on the bumpy side of their leaves. Talk about how this side of the leaf feels.
3. Ask the students to put their leaves, paint-side down, on white paper.
4. Place the newspaper pages over them, and press to make the prints.
5. Remove the newspaper and peel off the leaves (with clean fingers).
6. Compare the physical characteristics of each student's leaf print.
7. Place the prints on a large piece of craft paper to make a fall class mural.
8. Have the students write a poem on their craft paper about their leaves.

Assessment:

Observe the different shapes, sizes, and vein patterns of leaves as they make finger paint leaf prints. If possible, take a walk or look outside your window to watch leaves falling from the trees. Notice how they glide, spin, or quickly drop down. Then put on some soft music and have the students pretend that they are falling leaves. Some books for extending the lesson are: All Falling Down by Gene Zion, Frederick by Leo Lionni, and The Wonderful Tree by Adelaide Holl; have the students respond to the reading and discuss.

SEED MOSAIC

Grades: K-3
Subjects: Math and Arts
Montana Standards: Math 4 & 7, Art 1
Approximate Time: 1 hour

Objectives: Students will

- Study different geometric shapes and patterns.
- Understand what seeds are and where they come from.
- Learn about different textures, sizes, shapes, and colors of the seeds and how this relates to Art.

Materials Needed:

- Vegetable or flower seeds
- Zip-lock freezer bags
- Cardboard
- Pencil
- White Glue
- Small Cups
- Paintbrush

Keywords:

Mosaic, geometric, seeds, collage, variety, patterns

Brief Description:

Students will create a geometric seed mosaic with a variety of vegetable and flower seeds.

Lesson:

1. Collect a variety of seeds for the students to use in this project. Bigger seeds are better; some seeds are too small to handle especially for the younger students. Discuss with students the different vegetable and flower seeds and how they are made.
2. Have the students draw a geometric shape on the piece of cardboard with a pencil. (Quilt books are a nice way of showing the students examples of geometric patterns.)
3. Put a limited amount of white glue in a small cup.
4. Using a paintbrush, cover a small portion of the design with white glue.
5. Arrange seeds over the glued area following the lines and shapes the students have drawn.
6. At this point you could discuss with your students about the variations in texture, size, shape, and colors of the seeds.
7. Continue until the entire mosaic is covered. Allow the glue to completely dry, about 24 hours, before setting the collage upright or hanging.
8. When you are finished store any leftover seeds in zip-lock bags in a cool dry place.

Assessment:

Students should have drawn a geometric design on their cardboard and follow this pattern by gluing the seeds down. At the same time using a variety of seeds to create texture and color to their artwork. Have them assess wheat they like about their geometric design and if they know anything about the types of seeds they used.

GREENHOUSE PLANTING

Grades: K-3
Subjects: Science, Language Arts
Montana Standards: Science 3, Literature 1 & 5, Writing 1
Approximate Time: 6 weeks to a month

Objectives: Students will

- View and compare an indoor and outdoor plant.
- Plant their own plant to grow from seed
- Understand the reason behind greenhouses.
- View the inside and outside of a seed.

Materials Needed:

- Jack's Garden by Henry Cole
- Plants outside
- Variety of seeds
- Clear plastic cups
- Soil
- Water
- Permanent black marker
- Journal paper
- Knife
- Magnifying glass

Keywords:
Plants, nursery, orchard, rootstock, ornamentals, foliage, rhizomes, turf, succulent, decorative, vegetable

Brief Description:
A nursery is a place for young plants. A nursery may have trees that farmers want to buy. The farmers will plant these trees in their fields so the fields will become orchards. Another nursery may have plants that you want to buy. You may buy a plant for your yard or for your home. Plants inside your home grow in pots, and sometimes we call them potted plants. A nursery usually has at least one greenhouse. This greenhouse is full of green plants, and the air must be kept just right—not too hot and not too cold—so the plants will grow.
Many greenhouse owners cannot operate during the winter months because of the high cost of heating. Greenhouse owners in the coastal areas of our country have an advantage because of their mild climate—both summer and winter—making a controlled climate inside their greenhouses less costly. California is the number one producer of nursery products in the United States.
Some nurseries provide the vines, trees, or seedlings for farmers to plant. Many trees grow on rootstocks, that is, they grow on a root other than the natural root. Using rootstock allows better production and heartier trees. Some trees are already grafted before selling to the farmer or grower. Nursery production may be divided into the following categories:

Foliage plants	Woody ornamentals
Flowering potted plants	Vines, fruit and nut trees
Bedding plants	Bulbs, rhizomes, turf, succulents, decorative
Vegetable plants	

Lesson:

1. Read the book Jack's Garden by Henry Cole to the students.
2. Look around you school and have students located a tree, bush, or plant to observe.
3. Describe the plant. Why do you like it? Do you know the plant's name? What you're your plant need to grow? Have the students write a paragraph and draw a picture about their plant in their journal. Make sure the students understand what a journal is.

4. Ask the students to keep a journal and record all of the changes in their plant. Note changes in flowering, growth, fruit, production, disease, etc. Also any wildlife, such as birds or squirrels. Encourage your students to be aware of the life around them.
5. Bring a variety of seeds to the class so the students can pick what kind of plant they would like to grow in the classroom.
6. Cut a few of the seeds in half with a knife.
7. Have students look at the seeds through a magnifying glass.
8. Students can view the inside and outside of the seed.
9. Put some soil in a cup. Use clear plastic cups so students can see the roots growing.
10. Place seeds in the soil.
11. Label each cup with what is growing in them and the students name using a marker.
12. Water the seeds. Do not overwater or underwater.
13. As the plants grow discuss with the students the parts of the plant. What are the leaves? What are the roots? Where is the stem?
14. At the end of several months they should give a brief oral report on both their inside and outside plants.

Assessment:
Students should understand the difference of growing a plant inside, like the in the greenhouses, and outside. Encourage students to read about seeds and plants. Some suggested books are From Seed to Plant by Gail Gibbons, The Tiny Seed by Eric Carle, The Reason for a Flower by Ruth Heller, Anna's Garden Songs by Mary Steele, Jack and the Beanstalk by Susan Pearson, and How a Seed Grows by Helene J. Jordan.

COMPOST IN A BOTTLE

Grades: 3
Subjects: Science, Math and Literature
Montana Standards: Science 1, 2 & 4, Math 5, Writing 1 & 6
Time: 30 minutes and 5 weeks

Objectives: Students will

- Cite four functions of horticultural soils that can be distinguish from soils for general agriculture.
- Describe why each type of soil has both good and bad qualities.
- Make compost in a bottle.

Materials Needed:

- Shallow bowl
- Wide sampling of inorganic and organic soil amendments
- 2 liter soda bottles cut in half
- Spray bottle
- Garden soil
- Spoons
- Vegetable or fruit scraps
- Leaves, grasses, and small twigs
- Cheese cloth
- Rubber bands

Keywords:

Soil, ornamental, horticulture, texture, amendments, environment, organic, inorganic, compost

Brief Description:

The management of soils for gardening and ornamental horticulture is, on the whole, more intensive than that for agriculture in general. Especially in the area of nursery production and the production of high-value specialty plants, the value of the plants justifies higher growing costs. Growers can afford to spend money on, among other things, relatively expensive soil amendments to attain better and faster results. In the landscape, the high value of plants in relation to their size and placement, justifies the extra inputs necessary to provide and maintain a soil environment conducive to plant vigor.

Horticultural soils have the same functions as general soils, with a few points emphasized. Support: Besides providing support, the soil for many nursery products is part of the packaging and marketing material. Keeping soils light is important for this reason. Nutrients: Most horticultural products are grown with very high levels of nutrient added from sources other than the soil (fertilizers). A fertile soil is desirable, especially in a landscape situation, but not imperative. Still, soil conditions must be correct for effective nutrient exchange (ph, CEC, etc.). Moisture: Water must be able to move in and out of horticultural soils with ease. Air: Air is extremely important in horticultural soils, especially where fast growth (from high rates or respiration) is desired.

Lesson:

1. Have students collect samples of a variety of soil amendments, learning the name and uses of each, and whether they are of organic or inorganic origin.
2. Have students gather around a work table; you may want to lay down plastic or newspaper this can get messy.

3. Examine each soil sample to see the good and bad sides of each type.
4. Have the students graph their findings of organic and inorganic soils or good and bad soils.
5. Make compost in a bottle.
6. Lay out the assortment of materials. Food scraps, leaves, grass, twigs.
7. Instruct students to place the materials in the bottle in alternating layers of brown, green, brown, etc… Make the layers ½ inch thick. A 50:50 mixture of browns and greens usually works best. A pile too high in browns will break down too slowly. A pile in greens will get slimy and smelly.
8. Cover the food scraps with a thin layer of dirt so that there will be no smells or bugs. Repeat the layers until the cup is filled to about one inch below the top.
9. Add three to six tablespoons of water so the compost becomes moist, but not soaking wet.
10. To deter fruit flies and other pests, attach a piece of cheese cloth over the cup with a rubber band and have the students put their names on the cups.
11. Place the cups on a window sill or other appropriate place in the classroom.
12. Students should stir their cup of compost once a week and spray it with water if it starts to dry out.
13. Each week, for about 5 weeks, observe the various stages of decomposition. Involve the senses during observation time. What does the compost look, feel, and smell like? Keep a class chart to record their observations.

Extended Lesson:

14. Once the compost is finished, use it as a seed starter. Explain that compost adds plant food to the soil and improves soil conditions so that vegetables and flowers grow healthy and strong.
15. Poke a few holes in the bottom of each bottle to allow water to flow out. Place a saucer or lid under the bottle to catch any excess water.
16. Plant seeds (marigolds, radishes, and beans germinate quickly) into the compost.
17. Place cups in a sunny spot and keep it moist by watering regularly. You may also try to use the top of the bottle that you cut off earlier to cover the seedling in the cups.
18. The students might also experiment with where they place their cups of compost affects how their seeds grow.

Assessment:

Using their collection for review, students should be able, presented with an array of soils, to recognize and name the various materials. In the students bottles of compost are there any compost critters at work? Hand lenses or magnifying glasses will allow the students a closer look. At the end of 5 weeks discuss the results of the composting activity. Have them write a description of the decomposition process and a conclusion about the value of composting.

LOVE THOSE POTATOES

Grades: K-3
Subjects: Math, Science & Health
Montana Standards: Math1 & 6, Health Enhancement 5, Science 5
Approximate Time: 4 days

Objectives: Students will

- Identify the many ways to prepare a potato for eating.
- Choose and graph their favorite potato product.
- Sample numerous types of potato products.
- Become aware of the various ways potatoes are processed for the consumer.

Materials Needed:

- Potato products-examples
- Large paper potato
- Graph
- Ingredients and supplies for potato cakes or baked potato bar

Keywords:

preservation, freezing, canning, dehydrating

Brief Description:

Potatoes were first grown by Indians in the Andes Mountains of Bolivia and Peru as early as 200 A.D. Archaeologists have pictures of potato plants in designs on ancient pottery. The Indian preserved the potatoes by trampling them and then drying them.

Even though potatoes were first grown in South America, people in North America did not start eating them until after they become a popular food in Europe. European explorers carried potatoes from South American to Europe. European explorers carried potatoes from South America to Europe in 1570. About 150 years later the rulers of several European countries ordered their people to start growing potatoes. Potatoes became the main food for the people in Ireland. In the 1840's disease wiped out the potato crop in Ireland for two years in a row. Many Irish people moved to America because they had no food to eat.

Today, most of the world's potatoes are grown in Europe. Potatoes are also grown in all 50 of the United States. The biggest potato-producing state is Idaho. Many people in the U. S. grow potatoes in home gardens and harvest the potatoes while they are still small. These are called new potatoes. The average American eats about 65 pounds of potatoes a year.

Montana growers sold about 250 million pounds of certified seed potato tubers in 1998, according to Ralph Peck, director of the Montana Department of Agriculture. This amounted to over $20 million in sales for the seed potato industry.

Montana's seed potato growers are leaders in the seed potato industry, "Peck said. Through the Montana Potato Improvement Association (MPIA) and Montana State University, the seed potatoes are tested and scrutinized to provide only the finest in seed stock for the industry. The department provides shipping point inspection to document the quality of the product at shipping. Seed potatoes are shipped from Montana to numerous locations around the world, including the Pacific Northwest and Canada.

Montana's seed potatoes are grown in numerous western Montana valleys. Although Montana is best known for its seed potato production, the state produces potatoes for direct consumption as well.

Potatoes were first grown in Montana in the Bitterroot Valley at St. Mary's Mission in 1841 by Father DeSmet. The first potatoes grown commercially in Montana were in Virginia City at the mining camps in the 1860's. Potatoes were very important to the miners' diet because they were the only source of Vitamin C that most miners had.

A potato is a plant called a tuber. A tuber grows underground on stems. The potato plants grow leafy stems and flower above ground, and stems and tubers below ground. These tubers then become the potatoes. Potatoes take 60-90 days to develop into an edible stage. Some plants can grow 10 to 20 tubers (potatoes) underground but most potato plants average three to six tubers.

Potatoes are replanted each year because the plants die after the tubers mature into potatoes. Potato growers that grow lots of potatoes use machines to plant the potatoes. Small, whole tubers and segments of tubers are planted and new potato plants grow from these pieces. The tuber segments have at least one eye (bud) and the whole segments usually have more than one eye. These "eyes" develop into new stems which grow above and below ground. Then the stems below the ground will grow new tubers. When these tubers are mature, the potato growers use potato harvester to dig the potatoes out of the ground. These harvesters also separate the potatoes from the soil and put the potatoes into trucks.

Lessons:

1. The class and the teacher will brainstorm the numerous potato products. The teacher will write all of these products on a large brown paper in the shape of a potato. Examples (mashed, baked, fries, tater tots, chips, hash browns, gems, jojos, etc.)
2. The teacher will prepare a graph with a manageable number of favorite ways to eat a potato. The students could choose one or two favorites to be graphed. Possibly the teacher could lead a discussion on the most healthy type of potato product.
3. The teacher will provide potato products that are processed either through dehydration, freezing, frying, or canning. A whole group discussion will follow and children will be asked to bring various products from homes that are processed in any of the previous manners. The following day the students will present their products and explain the processing method that was used.
4. As a culminating activity you will make Potato Cakes (recipe included) or a Baked Potato Bar. A potato word search will be available for those who are waiting to cook their potato cake.

Assessment:

Students should identify the different ways in which potatoes can be prepared for eating. They should also be aware of the various ways potatoes are processed.

Potato Cakes

¼ cup butter
¾ cup white flour
½ teaspoon salt
½ teaspoon baking powder
3 cups freshly mashed potatoes (with milk)

Cut butter into flour until it forms large granules. Add salt and baking powder; mix well. Mix in potatoes. Knead for a few minutes. (This could be completed in a large zip-lock bag.) Roll out onto lightly floured board with floured rolling pin. (This mixture could be quartered and placed in sandwich size bags for individual students. The students could press the mixture flat rather than roll it out with the rolling pin.) Cut into four rounds. Cook on a lightly buttered griddle. Students may choose toppings that are supplied by the teacher and parents. Serve hot.

POTATOES

D S T J X N D L G O I S N C A

E A H A E S P U T Q R N F F P

T C L Z T O E A P O E W R D Z

X U O A T E T I O S L O E E G

B R O A S O R T R T A R S H C

F P T R P O S T S F N B H S Y

E O P D P G T W O V D H O A U

D J E U C S M A S T I S S M C

T E D E K A B W T M S A P A D

S O H K T R N Z C O B H I G C

J E B E U O E N H U P W H Q S

W O Z Y B Y F E E M R N C O N

T W I C E B A K E D K L J O G

L K L S R R E W O L F O Y F D

U F F L A K E S O M J S D U B

BAKED
BUDS
CANNED
CHIPS
CURLY
EYES
FLAKES
FLOWER
FRESH
FRIES
FROZEN
HASHBROWNS
IRELAND
JOJOS
MASHED
POTATO
POTATO SALAD
ROOTS
SEED POTATO
SPROUT
SPUD
TATERTOTS
TUBER
TWICE BAKED

POTATO "PHACTS"

Grades: K-2
Subjects: Science
Montana Standards: Science 1, 2, & 3
Approximate Time: Spring, 2 months

Objectives: Students will

- Observe and understand the growth process of the potato plant.
- Understand that the final product is actually the seed.

Materials Needed:

- Seed Potatoes
- Half-gallon milk cartons
- Soil-prefers sandy soil
- Small rocks
- Tub for soil

Keywords:

Seed potato, tuber, harvester, eyes, roots, sprouts, stems, vines

Brief Description:

There are four main reasons Montana is a natural place for seed potato production.

1. Cool nights are conducive to a high solids potato and high solids potatoes make better and more viable seed.
2. Montana has fewer vector insects (an insect carrier of a disease-producing virus) which, in turn, means a lower rate of spread of several serious virus diseases. Most other potato producing areas in other states cannot produce their own seed because insects inject viruses into thee crop, so they come to Montana for seed! Even though Idaho produces the most potatoes in the nation, their seed come from Montana!
3. Montana has "isolated" fields and that reduces the chances of disease contamination. This isolation is not possible to growers in other potato-producing states.
4. Because of our cool fall and spring weather, Montana's climate provides a good long-term storage situation and helps eliminate the expense of refrigeration.

Montana does not get high yields per acre and grows a relatively small-sized tuber-very desirable by the seed trade. So Montana grows a small, high solid, disease-free potato for commercial-producing areas at lower elevations. The process of growing the potato from the seed potato to a plant producing several tubers.

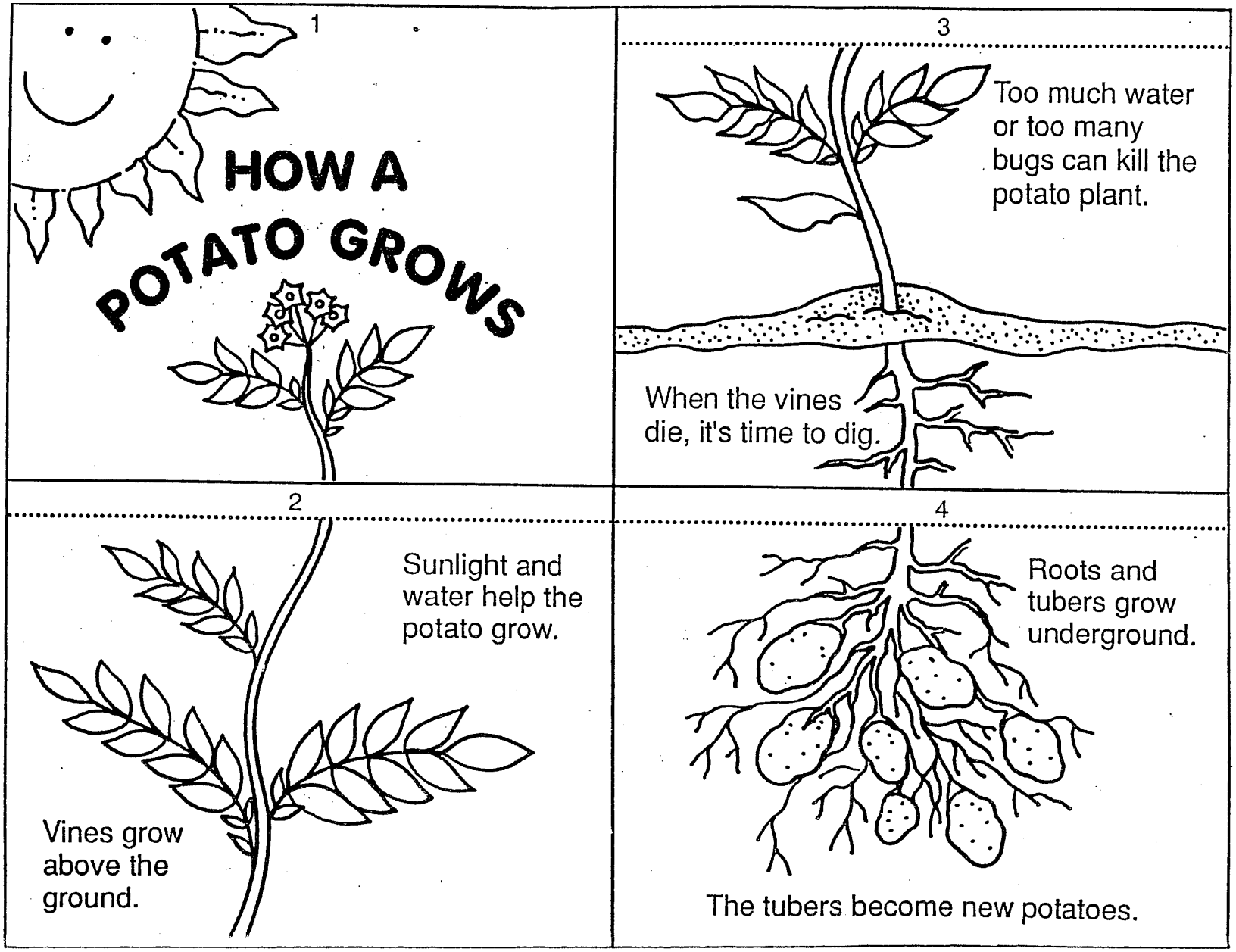
Lessons:

1. Teacher draws a diagram on the board on how a potato grows. Have a group discussion to thoroughly explain the process. Be sure to discuss the eye of the tuber as a vital part to begin the growing process. After the teacher feels the students have a good understanding of the growth process, then pass out the HOW A POTATO GROWS diagram work sheet. Have students color, cut out, and glue together in the proper order.
2. Using the POTATO PLANTING step-by-step guide, do the activity to emphasis the importance of the eye in growing a potato plant. Observe the development of the root system and stem of the beginning of the potato vine.

3. Individual planting of potatoes. Each student will be given a half-gallon milk carton. They will be called to a back table to place the small rocks, sandy soil, and a seed potato into the milk carton, in this order; covering the seed potato with about 2-inches of soil. The teacher will assist the students in watering their seed potato after the planting. While calling students back in very small groups, the remaining students can be working on creating their Potato Person. (sheets included) After the plants reach approximately six inches, send them home with the students to be planted in their gardens or flower beds for further growth and harvest in the fall.
4. 1 potato 2 potato. The students form a circle with the teacher in the center. The students hold both forearms out, elbows at their sides, with fists formed, thumbs on top. The teacher forms a fist and taps each child's fists, one at a time, and all chant: 1 potato, 2 potato, 3 potato, four, 5 potato, 6 potato, 7 potato, MORE. On the word MORE, the child must put that hand behind his or her back and this repeats over and over. When both hands have been put out, that child may now be the person in the middle and continue until everyone is out. That ends the game. After playing this game once, the teacher may want to choose a student to be in the center first the next time the game is played.
5. Visit a local potato operation. This will enable the students to see how a portion of the operation works.

Assessment:

The teacher may wish to survey the students in the fall of the next year to see who harvested their potato crop and how it produced


1
HOW A
POTATO GROWS
2
Sunlight and
water help the
potato grow.
Vines grow
above the
ground.
3
Too much water
or too many
bugs can kill the
potato plant.
When the vines
die, it's time to dig.
4
Roots and
tubers grow
underground.
The tubers become new potatoes.

POTATO PLANTING

You will need:

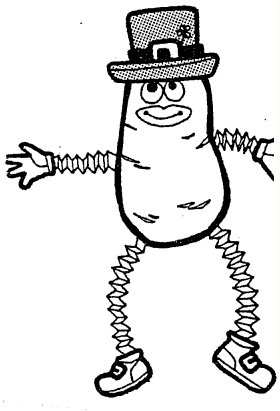
Potato	Large can
Knife	Bottle opener
Dirt	Pie pan
Potting soil	Water

1. Mix the garden dirt with the potting soil that you have a mixture of ½ dirt and ½ potting soil.
2. Put a layer of small stones or gravel in the bottom of the large can. Fill can 2/3 full of soil mixture.
3. Cut your potato into 4 pieces. 3 of the pieces must have eyes, or buds, on them. One piece should have no eyes or buds.
4. Plant your 4 potato pieces in the can. Cover with more soil then add water.
5. Use a bottle opener to punch 4 holes in the bottom of the can for drainage.
6. Put a pie pan underneath the can to catch drainage. Place in a sunny area. Water when needed.

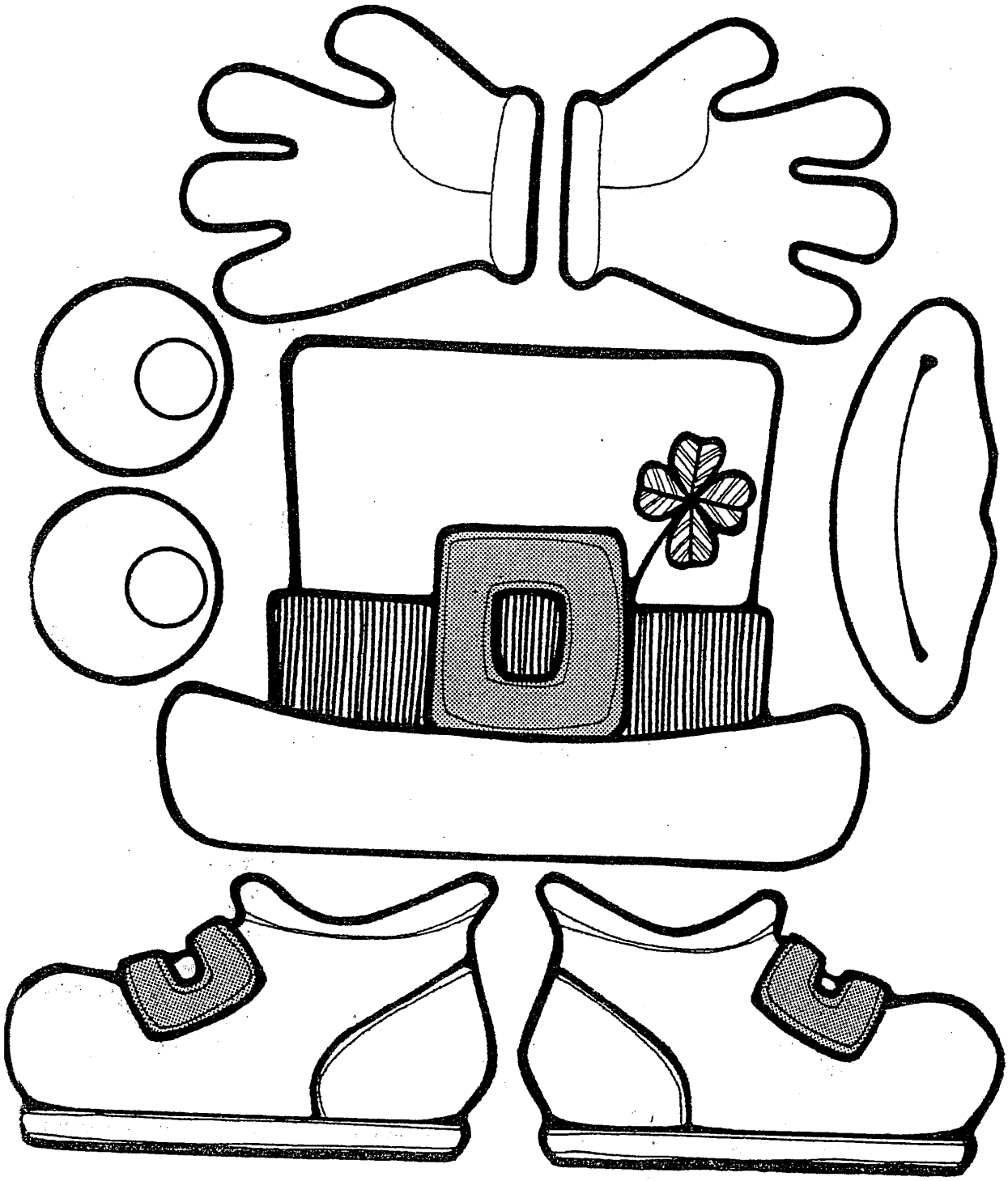
7. When a stem has grown at least 2 inches in height, uncover the potato pieces.
8. Draw diagrams of the plants' development.

POTATO PERSON PATTERN

1. Color and cut out the mouth, eyes, hat, gloves, and shoes on the next page.
2. Color and cut out the potato on this page.
3. Glue the hat, eyes, and mouth to the potato.
4. Accordion fold two 1-by-8-inch strips of construction paper for arms.
5. Accordion fold two 1-by-12-inch strips of construction paper for legs.
6. Glue one glove to one end of each arm.
7. Glue one shoe to one end of each leg.
8. Glue legs and arms to potato as shown.



POTATO PERSON PATTERN



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Apples All Around

Grades: K-3
Subjects: Science, Writing, and Art
Approximate Time: 3-20 to30 minute sessions
Standards: Science: 1, 2, and 3; Writing: 1, 2 and 4; Arts: 1and 6.

Objectives: Students will

- Comprehend and respond to literary works.
- Be able to draw an apple tree depicting what it would look like in each of the four seasons correctly and in sequence.
- Become aware of the life cycle of an apple tree and how an apple grows.

Materials Needed:

- Book: How Do Apples Grow? by Betsy Maesto.
- Book: The Seasons of Arnold's Apple Tree by Gail Gibbons.
- Apple patterns for shape book.
- Prints (tempera or water color) and small pieces of sponge.
- Apple and tree patterns for labeling. (Tree pattern pg. 14)
- Hunt for Apple Parts worksheet.
- One apple per student

Keywords:

Core, blossom, bud, stem, spring, winter, autumn, summer, petals, pollen, seeds, nectar, flesh, skin

Brief Description:

The first trees to produce sweet, flavorful apples similar to those we eat today, were found many thousands of years ago near the modern city of Alma-Ata, Kazakhstan. Greeks several varieties of apples by the late 300's BC. Ancient Romans also grew apples and loved the fruit. Charred remains of apples were found in a Stone Age village in Switzerland. In the early 1630's records show that apples were being grown in New England with seed and trees brought to the new world by European settlers. In 1796, in Ontario, Canada, John McIntosh discovered a variety of apple, which is today enjoyed by people around the world. There are many legends about apples from our past. In the Bible, apples in the Garden of Eden tempted Adam and Eve. Swiss tell the story of William Tell; an archer who was arrested then promised his freedom if he could shot an apple off his son's head. Americans have the legend of Johnny Apple seed who was famous for planting apple seeds and trees in Ohio, Indiana, and Illinois.

Apples are in the Pome family—a fruit bearing whose seeds are embedded in the core of fruit. Apples are members of the rose family. The average tree will produce fruit in about three years. One tree can produce about 20 boxes of apples. Washington State produces the most apples in the United States, followed by New York, Michigan, California, and others. In Montana most of the apples are grown primarily in the western valleys and south central part of the state. Apple trees prefer to grow on hillsides and tops of hills for drainage and because the cooler, heavier air falls to the valley bottoms. Apple trees need to rest in the winter for about 900-1,000 hours below 45 degrees Fahrenheit in order to flower and fruit properly. In the spring the trees produce white blossoms, which fall off leaving the pollinated flowers, baby apples begin to grow in their place. Farmers placing hives in the orchards use bees for pollinating the blossoms. During the summer the apples ripen and in the fall they are hand picked. A well-developed apple will have 5

compartments called carpels containing 2 seeds per carpel. If an apple tree is not healthy enough or the blossoms are not pollinated enough, the seeds will not develop properly.

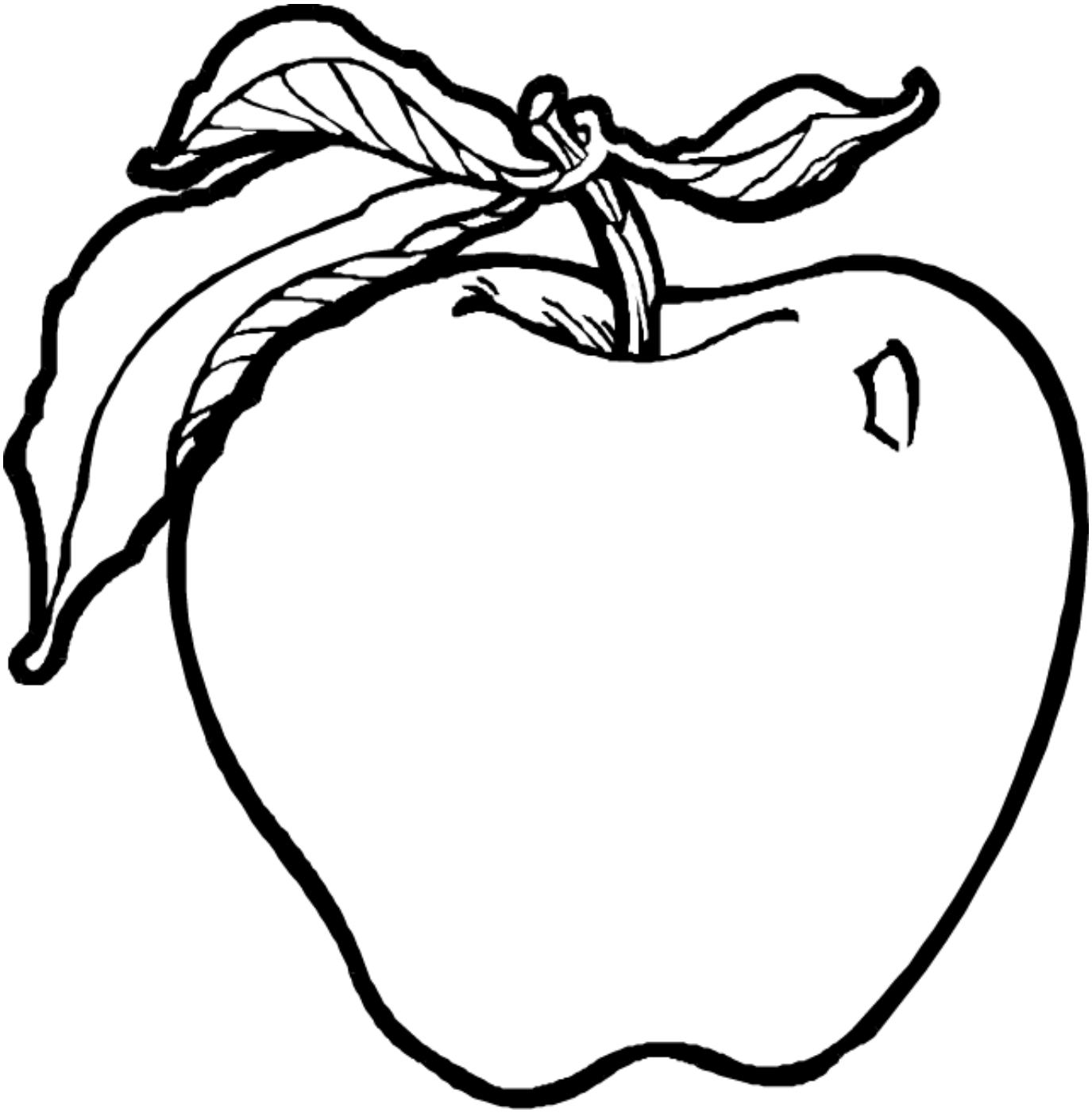
At the turn of the century newcomers to Montana were attracted to the Bitterroot Valley because of the irrigated land, which was marketed in orchard parcels. Growing apple trees in Montana is quite difficult because of the many variations in climate through out the state. Those apple trees that do have such here are the McIntosh, Lodi, Goodland, Carroll, Empire, and Haralson.

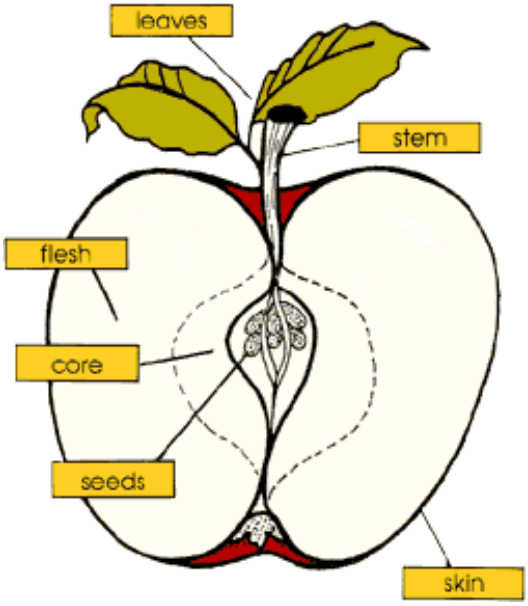
Lesson:

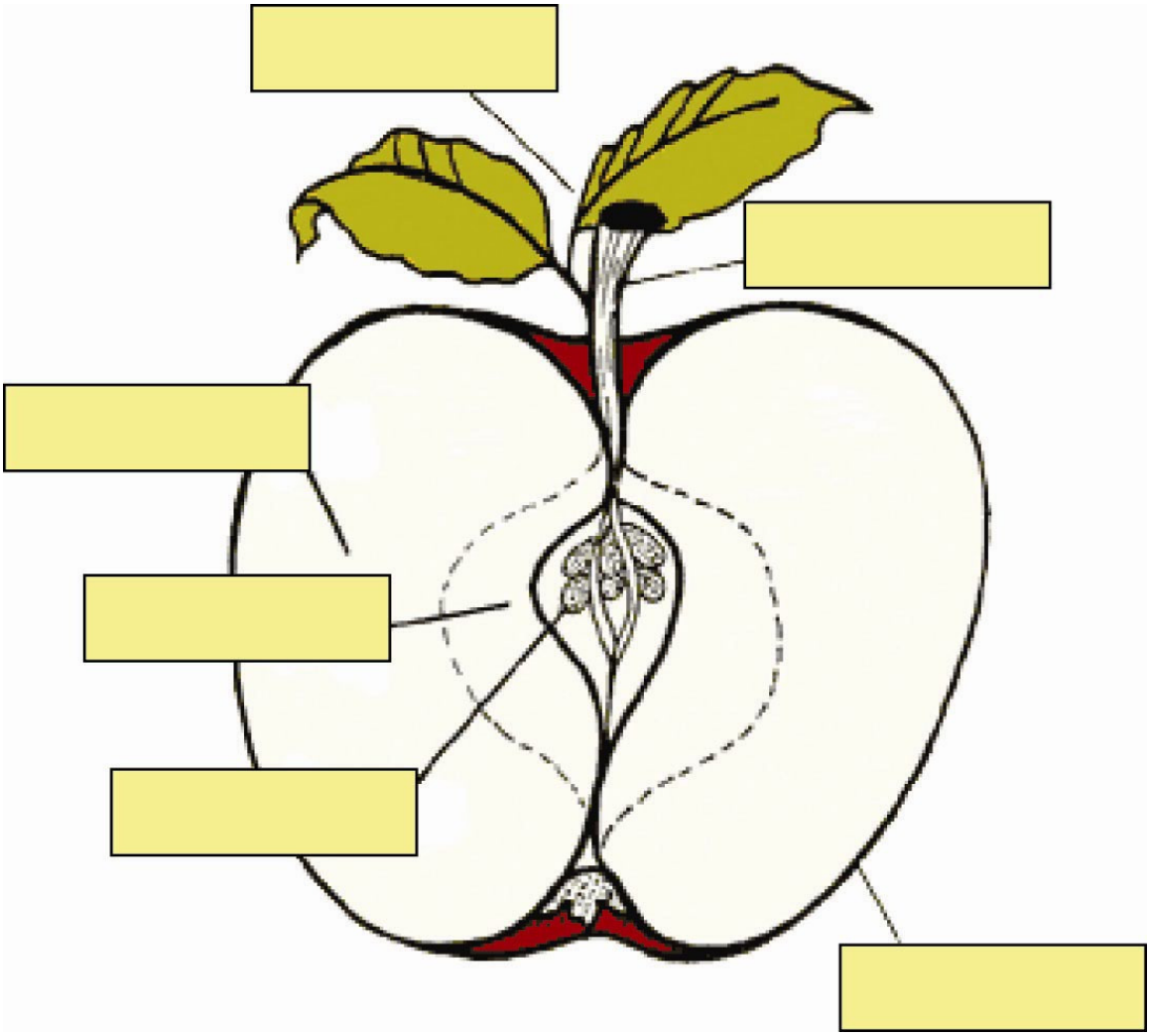
1. What is an Apple: Have a variety of apples on display for the students to examine. After students have had an opportunity to look at the apples, discuss what they see and know about apples, where they come from, and the parts of the apple, etc. Record their findings on an apple shape. Read the book, How Do Apples Grow? by Betsy Maestro and the story The Seasons of Arnold's Apple Tree by Gail Gibbons. Add information to the apple chart. Introduce webbing and have the students sort main ideas (headings) specific to apples putting one heading on each apple pattern, then sort the responses to the correct heading.
2. The Seasons of an Apple Tree: review the stories read in the previous lesson. Using a piece of paper 51/2" by 18" have the students fold the paper into 4 equal parts. Label each section with the name of a season in sequence. Take the students to look at an apple tree. Draw one tree in each of the boxes. Using red, pink, green, and brown paint, have the student paint what their trees should look like in each season. When dry, have the students cut the pages apart and write a least two sentences about the tree in the season on each page. Make a cover with a title and name. Share the books with the class.
3. Parts of an Apple Tree and an Apple: "The Little Red House With No Doors"—share the story with the class; as the story is told take an apple and cut it cross ways. Give each student an apple and have him or her predict if his or her apple will have a "star" inside. Record the predictions on a bar chart. Also estimate how many seeds will be in the apple and post their responses. After cutting the apples open, check the predictions and estimations. Explain the scientific process and have the class write a question concerning the number of seeds in each apple and if cut cross wise, would each apple have a star inside. Next write hypotheses, the procedure. Have the students collect many different kinds of apples and check findings. Explain why some apples have a different number of seeds in each carpel than others.

Resources:

The Seasons of Arnold's Apple Tree by Gail Gibbons
How Do Apples Grow? by Betsy Maestro
"The Little Red House with No Doors"
Activities Integrated with Math and Science 1984




leaves
stem
flesh
core
seeds
skin



Kernel Surgery

Grades: 1-3
Subjects: Science
Montana Standards: Science 2-5
Approximate Time: 45 minute

Objectives: Students will

- Learn the four major parts of a corn kernel and the function of each.

Materials Needed:

- Corn kernels
- Worksheet of the kernel

Keywords:
Production, product, ethanol, germinate, genetic, kernel, starch, plastic, bushel, pericarp, disease, endosperm, gluten

Brief Description:

The kernel is the most important part of a corn plant. It is the seed! It contains everything necessary for a new corn plant to germinate and begin its life. This small capsule contains all the food needed to provide energy for the germinating plant until it can feed itself. It also contains all the genetic material that will determine the traits of that plant. It is the product! Kernels are full of the nutrients and energy that people and animals need from their food. There are over 3000 human food uses for the kernels and their contents. Ground corn kernels are the major part of the diet for most of the animals raised for meat production. The starch and other components of kernels can also be used for industrial purposes, for example, ethanol fuel and plastic.

There are four major parts of corn (and all of them have kernels with the same four parts). Sweet corn that is eaten as a vegetable, field corn that is refined for industrial uses in addition to food products and animal feed, pop corn that is eaten as a snack, seed corn that farmer's plant in the field for crop production.

The typical ear of field corn contains 600-800 kernels. There are over 70,000 kernels in a bushel of corn. A bushel of corn typically sells for $2-$3. From that bushel of corn, from those 70,000 kernels it is possible to produce 2.5 gallons of ethanol fuel, or 31 pounds of cornstarch, or 33 pounds of corn sweetener, plus 11 pounds of animal feed, over 2.5 pounds of gluten meal, and 1.6 pounds of corn oil.

Lesson:

1. Ask students to read the story David Makes Cupcakes, paying close attention to the last several paragraphs which describe many of the food products made from corn.
2. Discuss with students the importance of these kernels.
3. Hand out kernels of corn to the students for them to see and touch.
4. You can cut the kernels to look at the inside of them. You may need to soften some kernels so the students can cut them in half, or do this yourself prior to the lesson. Field corn will be difficult to cut; mature sweet corn will be softer. Do NOT use seed corn because it will have been treated with fungicides to prevent seedling diseases in the field. Frozen corn from the store is fine, but will not show the visual parts as well.
5. This drawing could be used as a handout or as an overhead transparency. Because of space limits, it may be a good idea to blow up the diagrams.
6. Hand out the dot to dot worksheet so the students can complete the diagram of a corn kernel and write in its parts.

Assessment:

Students should have a good understanding of the parts of the kernel and their uses.

For more resources and activities: National Corn Growers Association. www.ncga.com
122 C Street, NW, Suite 510
Washington, DC 20001
(202) 628-7001

THE ENDOSPERM

The endosperm is about 82 percent of the kernel's dry weight and is the source of energy (starch) and protein for the germinating seed. There are two types of endosperm, soft and hard. In the hard endosperm, starch is packed tightly together. In the soft endosperm, the starch is loose. When corn dries in the field before harvest, the moisture loss causes the soft endosperm to collapse and form a dent in the top of the kernel, thus the term "dent" corn.

THE PERICARP

The pericarp is the outer covering of the kernel that protects it from deterioration. It resists water and water vapor and is undesirable to insects and microorganisms.

THE GERM

The germ is the only living part of the corn kernel. It contains the essential genetic information,enzymes, vitamins and minerals for the kernel to grow into a corn plant. About 25 percent of the germ is corn oil. Corn oil is the most valuable part of the corn kernel. It is high in linoleic fatty acid (polyunsaturated fat) and has a bland taste.

THE TIP CAP

The tip cap is the only area of the kernel not covered by the pericarp. It was the attachment point of the kernel to the cob.


12
28
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21
20

THE GRAIN SCAVENGER HUNT

Grades: 2 & 3
Subjects: Reading & Math
Montana Standards: Reading 1 & Math 2
Approximate Time: 2-20 minutes sessions

Objectives: Students will

- Recognize food products for each of the five Montana crops.

Materials Needed:

- Worksheets a and b for each student
- Grain food products that are not normally part of students' diets (example: cornmeal muffins, soy nuts, whole grain crackers, corn tortillas, tofu)

Keywords:
Predominant, ingredients, tofu, grains, soy

Brief Description:

Supermarkets are the predominant type of food retailer in the United States. The first supermarket opened in 1930 in Queens, New York. They gained popularity during the Great Depression as they cut costs by allowing customers to select products rather than having a clerk fill the customer's list. Today's supermarkets may have as many as 20,000 food items. Many will contain at least one ingredient made from wheat, oats, sunflowers, corn and barley. This activity will help students see how many different foods contain at least one ingredient from the crops in these lessons.

Lesson:

1. Have students read stories about the crops you will cover in this lesson.
   i. Walter the Baker by Eric Carle
   ii. The Sleeping Bread by Stefan Czernecki and Timothy Rhodes
   iii. The Little Red Hen Makes a Pizza by Philemon Sturges
2. Allow students to sample some grain food products that aren't normally part of their diet.
3. Hand out worksheets a and b.
4. Students will need to take the worksheets home and complete them by looking through their pantries and refrigerators or while grocery shopping with a parent.
5. Give students some tips about how to complete the worksheets.
   Baking aisle—flours, cornmeal, pancake and baking mixes, vegetable oils/shortening, soy milk, corn syrup
   Product aisle—tofu, soy yogurt, power bars, sunflower kernels, soy nuts
   Snacks or nuts—crackers, chips, oils, cornmeal
   Frozen foods—pizza, vegetarian foods
6. Challenge students to locate at least three foods from each of the five crops.
7. Sing the Oats, Peas, Beans and Barely Grow song for fun.

Discussion Questions:

a. What foods have you eaten that were made from these crops?
b. Have you tried soy products?
c. What products were made from more than one crop?

Resources:

Kansas Foundation for Agriculture in the Classroom

Worksheet a

Name_____

Scavenger Hunt

Directions: Look in your kitchen or at the supermarket to find the foods made from, or that have an ingredient made from wheat oats, sunflowers, corn, and barley. Take home the following chart, search and see! Try to find at least three foods or ingredients for each--write down the ingredients or products that are made from each group.

Wheat	Oats	Sunflowers	Corn	Barley

Hints: Check out the baking, cereal, snack food, baked goods, and fruits and vegetable aisles. Read labels!

Wheat:	*Oats:*	*Sunflowers:*	*Corn:*	*Barley:*
flour, bran, semolina	*oatmeal, grain bars*	*kernels, oil*	*oil, cornmeal, syrup*	*oil*

Worksheet b

Name_____

Scavenger Hunt Questions

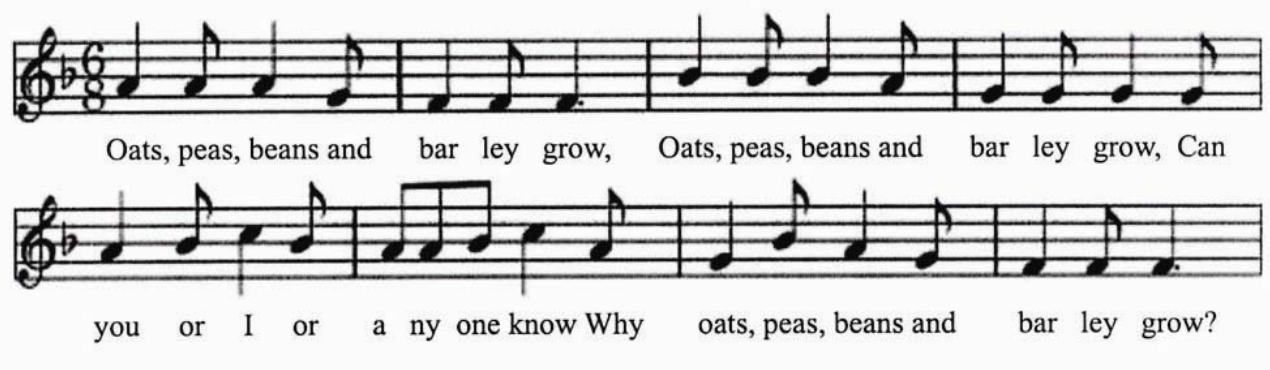
1. Make a bar graph out of your scavenger hunt chart by coloring each column a different color. Number the rows wheat, oats, sunflowers, corn and barley. Which crop was found in the most food? _____
   The least _____

2. Write the names of foods or ingredients you have never tried. _____

3. What new food(s) would you like to try? _____

4. Which food products were make from more than one crop?
   _____

Oats, Peas, Beans and Barley Grow



(Do the motions as you sing)

Oats, peas, beans and barley grows,
Oats, peas, beans and barley grows,
Can you or I or anyone know
Why oats, peas, beans and barley grows?

First the farmer sows his seeds
Stands erect and takes his ease,
Stamps his foot and claps his hands
And turns around to view his land.

(Repeat First Verse)
Next the farmer waters the seeds,
Stands erect and takes his ease,
Stamps his foot and claps his hands
And turns around to view his land.

(Repeat First Verse)

Next the farmer hoes the weeds,
Stands erect and takes his ease,
Stamps his foot and claps his hands
And turns around to view his land.

(Repeat First Verse)

Last the farmer harvests his seeds,
Stands erect and takes his ease,
Stamps his foot and claps his hands
And turns around to view his land.

(Repeat First Verse)

Sunflowers

Grades: 1-3
Subjects: Science
Montana Standards: Science 2-5
Approximate Time: 40 minutes

Objectives: Students will

- Identify sunflowers, sunflower seeds, some foods made from sunflowers, and other uses of the plant.
- Demonstrate the basic steps in planting a seed.

Materials Needed:

- Sunflower seeds
- Plastic or paper cups
- Potting soil
- Bright lamp or windowsill
- Spray bottle for water
- Sunflower seed snacks
- Scissors
- Glue

Keywords:

Pollination, periphery, phenomenon, disease, confectionary, substitute, dampened, excessive, millet

Brief Description:

The sunflower *(Helianthus annuus)* is believed to have been domesticated from wild sunflowers around 1000 B.C. in the western United States. The wild sunflower plant is highly branched with small seed heads and small seeds in contrast to the large seed head of the domesticated sunflower. One reason the sunflower is grown so widely is its relatively short growing season, generally requires 90 to 100 days from planting to maturity in the north-central United States, and somewhat longer for longer-season varieties grown father south.

Sunflower heads consist of 1,000 to 2,000 individual flowers joined together by a receptacle at the base. The large petals around the edge of the head are actually individual ray flowers, which do not develop seeds. Pollination and seed development begin at the periphery of the grain head and move toward the center. It usually takes about 30 days from the time the last flower is pollinated to seed maturity.

A well known sunflower characteristic is that the flowering heads track the sun's movement, a phenomenon know as heliotropism. Most new varieties have heads that droop down to face the ground as the plants mature. This helps reduce damage from birds and from diseases that could occur if water collected in the sunflower heads.

Uses of Sunflowers

Food—Most United States production is devoted to the oilseed sunflower, while a smaller percentage is grown for whole-seed confectionary uses, such as candy, snack food, and baked goods. Vegetable oil is the main use for sunflowers grown in the eastern part of Montana. Sunflower oil is considered premium oil due to its light color, mild flavor, low level of saturated fats, and ability to withstand high cooking temperatures.

Ornamental—Many people grow sunflowers in backyard gardens during the warm growing season, both for food and ornamental purposes. In recent years, the sunflower has become extremely popular with gardening enthusiasts, encouraging seed companies to produce a wide selection of sunflowers with ornamental qualities for cut-flower display, and attraction for birds and wildlife.

Birdseed—Another well-known use of sunflower seed is for birdseed, most typically mixed with millet and other grains. The black oilseed varieties are also sold separately, and usually are favored by birds over the striped confectionary seeds. The high oil content of sunflower seeds provides an excellent source of energy for birds.
Livestock—Sunflowers are sometimes used as livestock feed and, in recent years, the chopped stalks have been determined to be a reasonable silage crop.
Industrial—Although the sunflower has the potential for many industrial uses, it is mostly used for food or feed purposes. Sunflower hulls have a limited market for specialty purposes such as poultry litter, fireplace logs, and other high fiber products. Sunflower oil has been researched as a potential diesel fuel substitute.

Lesson:

1. Give each student 2 to 3 sunflower seeds in a small container. Have them examine the seeds carefully. Ask what they will need to plant the seeds.
2. Pour a small amount of soil onto each student's desk or into his or her hands.
3. Have students describe the soil. What is it made of? What color is it? How does it smell?
4. Pass out planting containers with drainage holes and have each student write his or her name on the containers.
5. Have students fill the containers almost to the top with dampened soil. Provide spray bottles of water to moisten the soil.
6. Have students poke a hole for each seed about one inch deep into the soil, place a seed in each hole and cover it lightly with soil.
7. Place the pots on a tray in a sunny window or under a lamp and water them when soil is dry to the touch.
8. Check containers daily to avoid excessive drying if placed near a heating device or in the hot sun.
9. In 5 to 10 days plants will emerge in each container. If more than one seed germinates, have students carefully cut out all but the healthiest plant.
10. Hand out worksheet a. Have students color the pictures, cut them out, and paste them in the proper order to complete the cycle.
11. Hand out worksheet b. Have students color the pictures, cut them out and use as sequencing cards.

Extension:

12. Shell and eat some sunflower seeds from the grocery store. Remember that seeds for planting may have been treated with pesticides. Do not eat treated seeds! Purchase only seeds that have not been treated.
13. Have students make calendars to keep a record of their plants' development.
14. Take pictures of plants daily, especially during the seed germination period. Show pictures of sunflowers from seed catalogs, magazines, etc…
15. Have students look at home for sunflower products or other seed products.
16. If possible, take a field trip to a greenhouse, farm, or landscape nursery that grows and/or sells sunflowers.

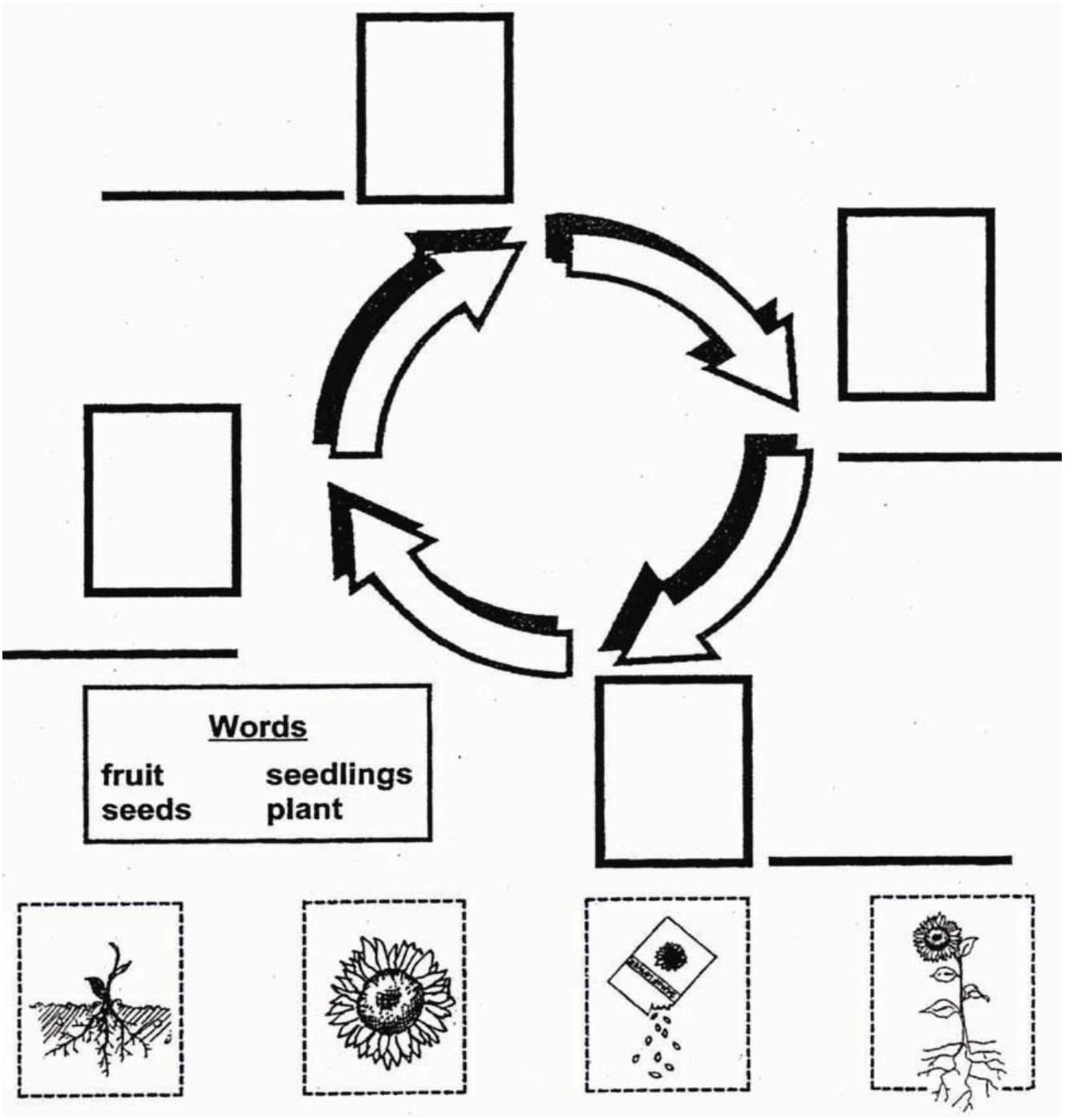
Resources:

Oklahoma Agriculture in the Classroom, Oklahoma State University, Department of Agricultural Education

Name _____ Worksheet a

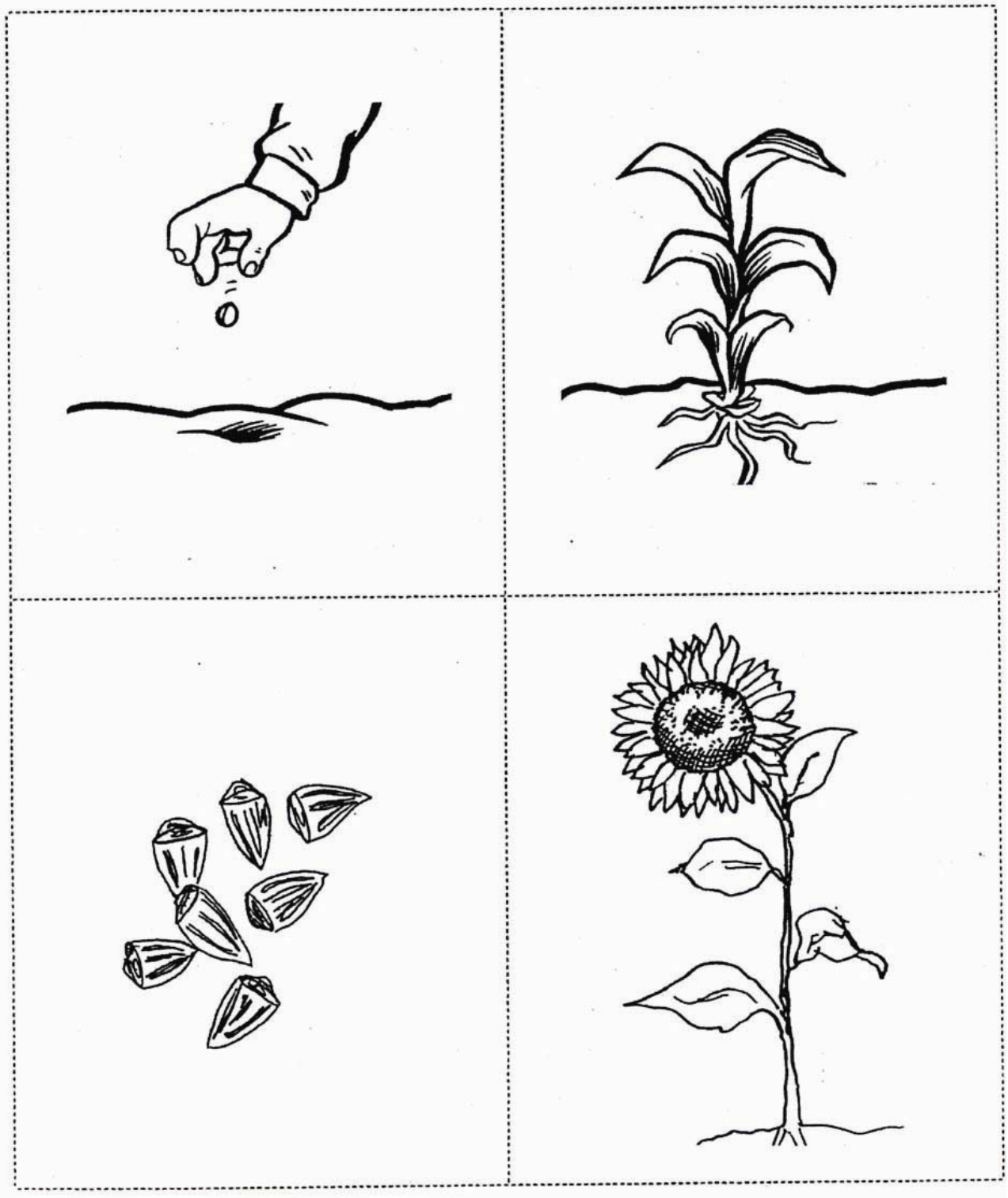
Here Come the Sunflowers!

Cut out the pictures at the bottom of the page. Paste them in order in the boxes to complete the cycle. Then write the correct word in the space provided.



Name _____ Worksheet b

Here Come the Sunflowers!



HOW SWEET IT IS

Grades: K-3
Subjects: Reading and Science
Montana Standards: Reading 1-4, Science 2-5
Approximate Time: 2-30 minute classes

Objectives: Students will

- Become familiar with how sugar beets grow.
- Demonstrate knowledge of keywords
- Become aware of by-products of sugar beets
- Be familiar with the sugar beet process

Materials Needed:

- "Sweet Words" word search
- "Sweet Crop" crossword puzzle
- Extracting sugar from sugar beets flow chart
- Sugar Beet diagram
- Beet Sugar Progress sheet
- Bags of sugar

Keywords:
Roots, stem, leaves, crown, pulp, molasses, syrup, hopper, cossettes, evaporate, crystallized

Brief Description:

Sugar beets are second only to sugar cane for sources of sugar. Montana ranks 6th in the nation in sugar beet production. In 1999, 1,468,000 tons of sugar beets were harvested in Montana. Most sugar beets are grown in south central Montana.

Sugar beets are grown from a seed, which produces a root, stem and leaves. The actual sugar beet is the root, which contains many cells. Large cells contain water, while small cells contain the sugar.

Sugar beet fields are easily mistaken for a field of potatoes. Above the ground they appear as only greens. Underneath lies the beet, which is light tan, also like a potato. However, sugar beets are more closely related to a red garden beet.

The crown or stem, is used to feed cattle, sheep and hogs. The pulp that is left after the sugar is taken out and can also be eaten by animals. Dried beet pulp is the dried fiber residue left after most of the sugar has been extracted. It can be produced and shipped in many forms: plain dried, molasses, dried and pelleted. It is primarily used by dairy farmers, as it caused the cow to produce more milk. Many sheep and cattle producers also use beet pulp to feed their animals. Another by-product is beet molasses. It is used for production of yeast, chemicals, medicine, and as a sweetener for cattle feed.

To extract the sugar from the beet, the beets are washed and cut into thin slices (cossets). These slices are put in hot water, which soaks the sugar out and forms a syrup. The syrup is then purified, filtered and boiled again. Finally it is dried to sugar, which is packaged and marketed.

Lesson:

1. Introduce children to the bag of sugar
2. Read introduction
3. Show and explain sugar beet diagram
4. Read "Sugar Beet Process"
5. Review "Extracting sugar from sugar beets" flow chart
6. Handout "Sugar Beet" word search / "Sweet Crop" crossword puzzle

Additional Resources and Information:

Montana States Beet Growers, Rt. 2, Box 3078, Forsyth, MT 59327
Holly Sugar Corp., Box 1168, Sidney, MT 59270
Videos: Montana Country – We Grow These Too!, AMS Treasure Chest

Beet Sugar Process

1. The sugar beets are harvested from the field and taken in trucks to the beet factory.
2. They are dumped into a wet hopper and float through the factory in a tube filled with water. On the way through, they are cleaned by moving through a rock and crash catcher (for weeds and leaves). They are further cleaned by a sprayer.
3. The beets are fed from the hopper into the slicers, where they are cut into strips, or cossettes. These cossettes fall onto a conveyor belt to be weighed and thrown into a tank. Here the sugar is removed by dissolving the beets in hot water. When the cossettes reach the opposite end of the tank they are beet pulp.
4. The beet pulp moves to the pulp dryer. The raw juice moves through purification and filtration to remove impurities and other non-sugars.
5. After it has gone through purification, it is in two forms: thick juice and thin juice. The thin juice must be sent through heaters and to an evaporation station. After evaporation, it is now thick juice.
6. This thick juice is boiled and crystallized to a high concentration of sugar, called massecuite. The massecuite is spun which separates the sugar crystals from impurities. The spun sugar then drops to a conveyor belt to go to the granulator for further drying and cooling. The finished sugar passes over sifters and moves on to the sugar bins for storage, or to the warehouse for packaging.
7. Other sugar, along with important by-products still remain in the syrups and washwater. It is sent back through the process. The pulp (dried cossettes) meanwhile has been further dried and squeezed in presses. This squeezing compacts the pulp into pellets so it can be handled more easily. It moves to the pulp warehouse.

“SWEET WORDS”

F K D S P L O J F M N P P L R

M N C U E X N I V O W R H I D

K L R A D S E E I L O Q G Z O

O Y V R E L T T H A R E N Y W

S E J F B T A E E S C W N L

S G K C Q R A L M S M G Q Z N

Q O N C O D F T H E C M J I R

D M Y P C S L H O S O L A W M

A F A V I N S A Z R G Q D B T

G V J Q Q F A E L R E P P O H

E F X X X R Z I T Y Z C K X P

P Z T X U D F F E T D W G G U

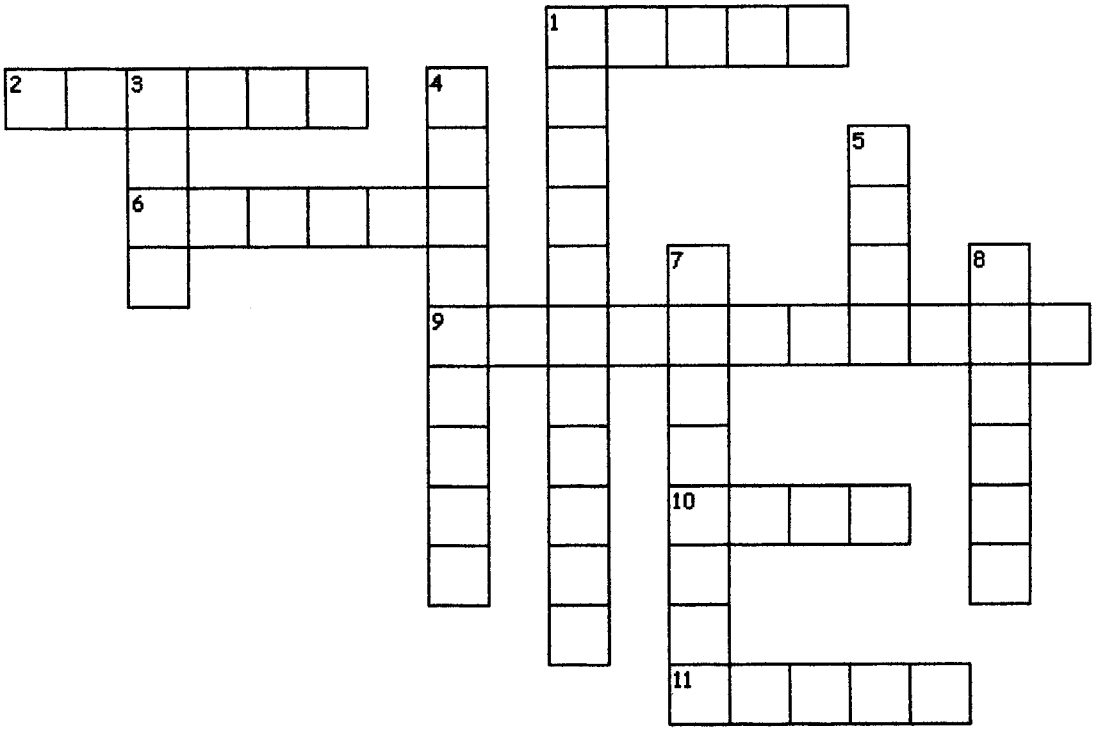
U P I L B K D I Q L E F A K L

C R Y S T A L I Z E D S N X P

R O O T N Q T P J G K F D N I

COSSETTES
EVAPORATION
MOLASSES
ROTATE
CROWN
HOPPER
PULP
STEM
CRYSTALIZED
LEAVES
ROOT
SYRUP

SWEET CROP



Across

d. another word for stem
e. tank holding water
8. flat green outgrowth of a plant
9. to drive out the moisture from heat
10. main stalk of a plant
11. thick solution of sugar and water

Down

a. solid clear substance
3. what is left after the sugar is taken out
4. strips of sugar beets
5. the actual sugar beet
9. thick brown syrup
8. to alternate crops

FROM FLOUR TO TORTILLAS

Grades: K-2
Subjects: Science, Language Arts, and Health
Montana Standards: Literature 1, Science 2, Health Enhancement 1
Approximate Time: 3 days

Objectives: Students will

- Become familiar with the process of growing of wheat
- Experience grinding wheat into flour
- Make and enjoy eating tortillas

Materials Needed:

- Wheat grinder
- Enough wheat to have 1 ½ cups flour for each group of 4 students
- I Wonder How Bread Is Made by Neil Curtis and Peter Greenland in AMS Library
- Recipe and ingredients for tortillas

Keywords:

Tractor, combine, plow, field, harrow, drill, sprout, harvest, straw

Brief Description:

Wheat is one of Montana's largest crops. Montana wheat is used as livestock feed or made into flour for foods like bread, cakes, cookies, crackers, and pretzels. Our wheat is also used for non-food items such as glue and pharmaceuticals. The farmer plants the tiny wheat kernels (another name for seeds) in the ground using a grain drill. The seed germinates (sprouts) and begins to grow into a plant, which consists of roots, a stem, long, slender leaves, and a head, which has kernels.

In August or September, the farmer combines or harvest the wheat and unloads the combine hopper into trucks or wagons. The farmer will haul the wheat to the local elevator. An elevator has giant silos to store grain. The farmer receives payment for his wheat, and then the elevator ships the wheat by truck or rail to a grain terminal. Next, the wheat is sold to various industries, which make food or feed, or for shipment overseas.

The place where wheat is shipped to make flour is called the mill. The people who process the wheat are called millers. The wheat is put through a cleaning process to remove foreign matter (weed seeds, corn seeds, beans, stems). Rollers then press over the wheat kernels to break them into pieces, and they are shaken on screens to sift out the bran (the broken coat of the kernel) and germ (the part of wheat used to grow a new plant) not used in wheat flour. This is repeated three times to make a soft powdery substance we know as flour. If whole wheat bread is what the mills wants to make, the bran and germ are added back in. Next the miller adds a special ingredient to the flour to whiten it, along with B-vitamins and iron for nutrients. The flour is shipped in bags to the bakery or to the grocery store. There are several types of wheat. For example hard red winter wheat has high protein and is used for bread flour and hard rolls. Hard red spring wheat has high protein and is used for bread flour and yeast breads. Soft red winter wheat has low protein and is used in pastries and crackers. Finally, Durum has low protein and is used in lasagna, spaghetti and macaroni.

Bakers like to use wheat flour because it contains a magical protein called gluten. To make bread dough, active yeast, warm water, and other ingredients are added to the flour. The gluten traps the air bubbles the yeast releases and causes the dough to raise.

Early elementary children may find the story, *The Little Red Hen* helpful in illustrating the process of turning wheat into bread.

This lesson will show the students the process from growing the grain to the finish product.

Lesson:

1. Read and discuss, through page 15, the book I Wonder How Bread Is Made. Explain to the students that the wheat they will be grinding will be used for the tortillas.
2. Grind the wheat kernels into flour.
3. Make tortillas in a bag.

Assessment:

Students made the connection of how grain is grown to produce the flour and the flour is taken and made into food products such as tortillas.

MAKE TORTILLAS IN A BAG

FLOUR TORILLAS

1 ½ cups all-purpose flour
1 teaspoon salt
½ teaspoon baking powder
3 tablespoons shortening (shortening is available in sticks and is easier to use in this form)
½ cup hot water (125-130°F)

In a large plastic bag combine flour, salt, and baking powder. Close bag and shake to mix.

To the ingredients in the bag, add the shortening. Close bag with twist tie and work mixture with fingers until the ingredients form soft dough that pulls away from the sides of the bag.

Add the hot water to the bag. Close the bag and mix with fingers until the ingredients form soft dough hat pulls away from the sides of the bag.

Turn the dough out onto a lightly floured surface. Divide dough into 4 equal pieces and shape into balls. Each child receives two balls. Cover them with the plastic bag, and let rest for 15 minutes.

Roll or pat the dough into 8 to 10-inch circles. Place each circle on a griddle or frying pan, heated to medium high. Cook until dark brown spots appear. Turn tortilla and cook on the other side until brown.

Want a quick meal? Roll up a tortilla with cheese, salsa and fat-free refried beans. "OR…make a fun dessert, sprinkle with cinnamon and sugar on top roll up and eat, OR…add pie filling for a tasty treat."

THE KERNEL SPROUTS

Grades: K-2
Subjects: Science and Math
Montana Standards: Science 1 & 2, Math 1 & 2
Approximate Time: 1 week

Objectives: Students will

- Discovering that one kernel of wheat produces many kernels
- Observe and document a kernel sprouting

Materials Needed:

- Stalks of wheat for each 2 children
- Picture of combine and truck or if possible a toy replica of each
- Jewelry size zip-lock bags
- Yarn for necklaces
- Strip of paper for each student approximately 5 ½ x 17
- Water hydrating crystals

Keywords:

wheat- a grass that belongs to the cereal grains, sprout, kernel, combine, roots

Brief Description:
Observing and journaling process of sprouting a kernel of wheat.

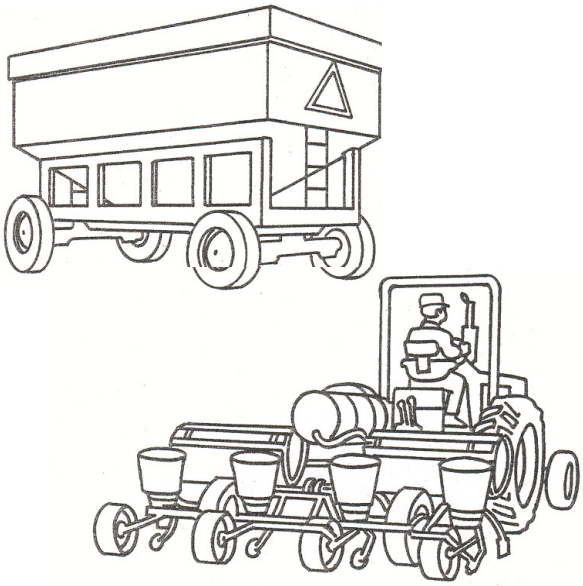
Lesson:

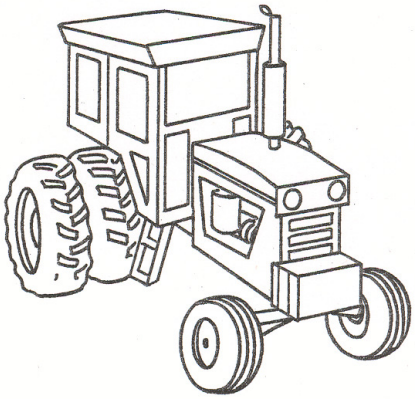
1. Give each pair of children a stalk of wheat. Have children break off stem. Explain that the stem is straw. Have children take turns rolling the head in their hands. Separate wheat kernel from chaff. Read numbers and estimate how many kernels most heads had. Count the kernels and record the numbers on a large kernel of wheat. Show poster or toy combine and truck and explain that what the children just did is the job a combine on the farm does.
2. Make sprouting bags. Teacher can squirt several drops of food coloring into a pint of water. Each child receives one kernel of wheat, 3or 4 water crystals, 1 small jewelry size zip-lock bag (with hole punched above the seal) and 3 or 4 drops of colored water. Zip the bag shut and thread yarn through to make a necklace. The necklace could be worn every day throughout the week. **They should be left at school**. Begin this activity on Monday to be able to journal throughout the week.
3. Fold 5 ½" x 17" strip of paper into fourths to make a book. Label cover with a title and glue on a kernel of wheat. Number the pages 1-5. Each day of the week observe, discuss, and journal by drawing or writing a few words. By the end of the week the kernel should have roots and a green sprout. Send home at the end of the week.

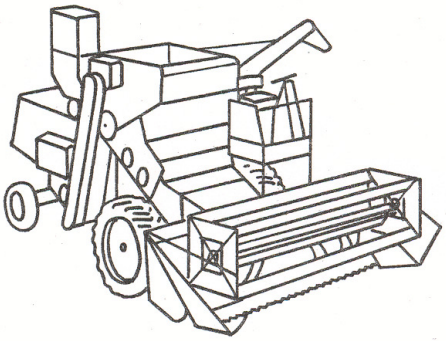
Assessment:

Reading and understanding the picture journal.

M is for **machine**. A farmer uses many kinds of **machines** to grow corn, soybeans, and wheat. draw a line to match the name of each **machine** with what it does.







Tractor—pulls other **machines**
Planter—plants seed into the soil
Combine—harvests crops
Wagon—carries crops

Read the word below. On a sheet of paper print the word.

machine

WHEAT DETECTIVE ON THE TRAIL

Grades: K-2
Subjects: Language Arts and Math
Montana Standards: Reading 4, Writing 4, Math 2
Approximate Time: 2 days

Objectives: Students will

- Become aware that many, many products we eat have wheat flour as a primary ingredient.
- Categorize wheat flour based foods according to the following possible categories:

pasta cereals breads
desserts fast foods

Materials Needed:

- Food containers with wheat as a major ingredient
- Large paper for food chart

Keywords:
Ingredients, wheat, flour, products

Brief Description:
We will be making children more aware that wheat is a major ingredient in many of the foods that are eaten on a daily basis around the world.

Lesson:

1. Teacher displays a box of crackers, loaf of bread, box of cereal, pizza box, box of spaghetti, and a cake mix (for example). The teacher explains to the students that a major ingredient in each of these foods is wheat flour. Teacher displays a chart with the following possible headings (pasta, desserts, cereals, fast foods, and breads). Brainstorm, with students, foods that will fit into each category. Ask students to bring empty containers (box, can, or bags) from home the following day of food products with wheat flour as an ingredient.

2. Chart the food containers that the students brought from home. Use the same categories as were used the first day. Kindergarteners could place their food containers in the appropriately labeled areas.

Assessment:
Have students complete The Western Wheat Kids worksheet and the W is for Wheat worksheet. For older students, have them write three wheat flour products that can be eaten for breakfast, lunch, dinner, and snacks. For fun, students may complete the dot-to-dot sheet titled Grain Based Food.

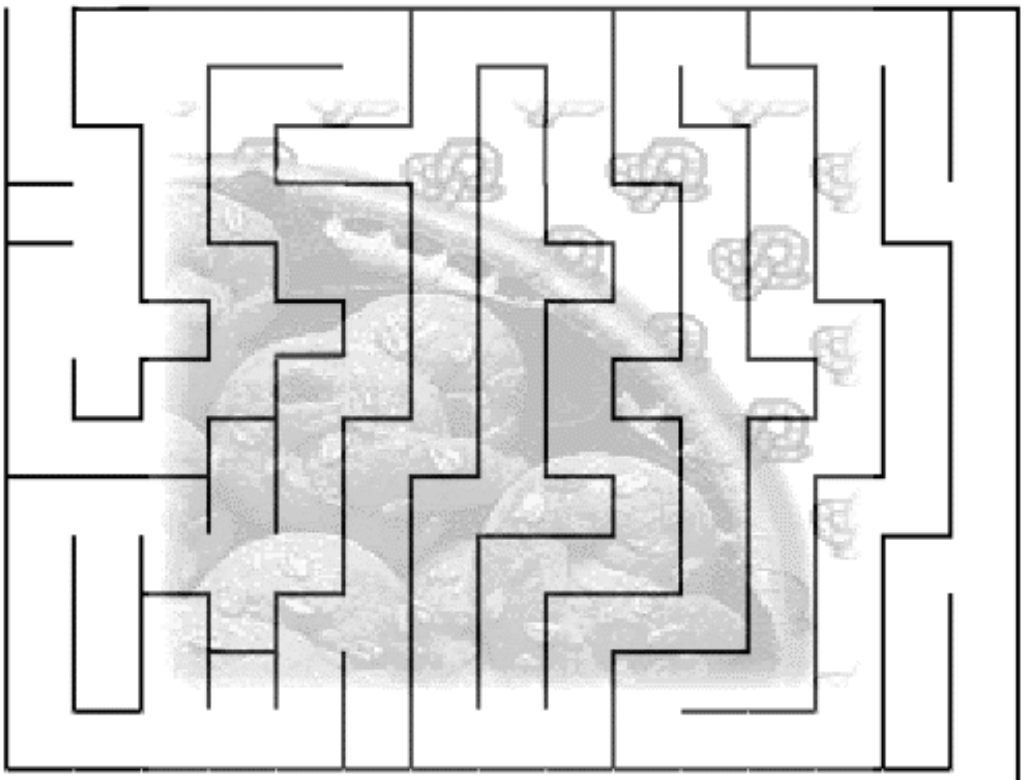
W is for **wheat**. Many farmers grow **wheat** in their fields. **Wheat** is made into flour. Flour is made into food like bread, cakes, pancakes, muffins, and spaghetti.

Read the word below. Then print the word.

wheat

Start

Help the twins find their healthy, wheat food snack!



FINISH

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Health &
Safety

GRAIN SAFETY RAP

Grades: K-3
Subjects: Language Arts and Music
Montana Standards: Writing 1 & 2
Time: 45 minutes

Objectives: Students will

- Learn how accidents can be prevented around grain.
- Create a farm safety rap song after learning about farm safety.

Materials Needed:

- Grain
- Plastic milk jug
- Scissors
- "Farm Safety Rap Song" worksheet
- Large sheet of paper
- Markers or crayons

Keywords:

Equipment, grain, unloading, suffocation, oxygen, safety, trapped, storage, bin, accident

Brief Description:

When grains such as wheat, barley, and corn are harvested, they are emptied into wagons, trucks, and storage bins. The grain moves from a large area into a small opening so a funnel is created by gravity. This funnel can pull people into the grain and cause them to suffocate, or die from lack of oxygen. It only takes two to four seconds to become helpless in a flow of grain. In 10 seconds, a person can be completely covered. Never play around grain equipment and never go in a grain wagon, truck, or bin while grain is unloading.

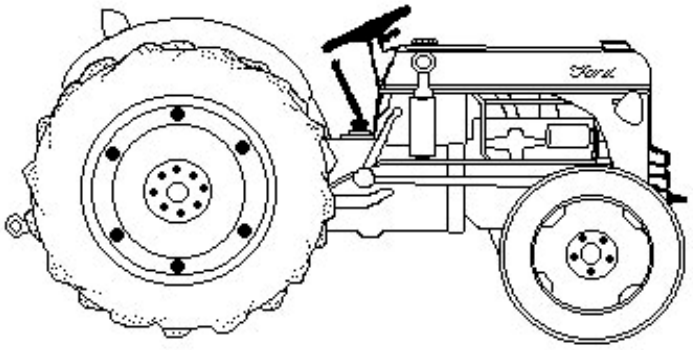
Grain suffocation can also happen in grain bins where the grain is stored. Sometimes a crust, or bridge, forms over the grain and people think it is safe to walk on. Actually, there is an open pocket underneath the crust that is not filled with grain. When someone or something steps on the crust, they can fall through, be covered by grain, and suffocate. Even adults do not have the strength to pull themselves out of grain before they are covered.

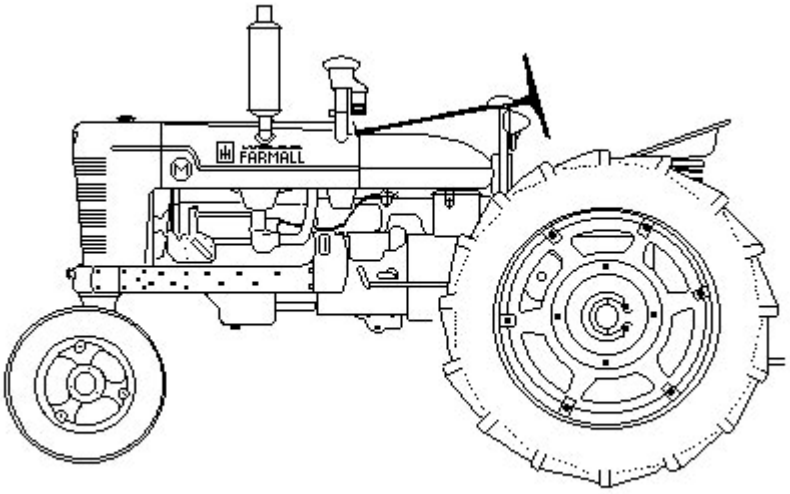
Lesson:

1. Talk to the students about farm safety. Ask them why accidents happen on the farm.
2. Make copies of the song for all the students.
3. Ask students to underline the rhyming words using various colors of markers or crayons.
4. Let the students make up their own farm safety rap. Write it on large paper with the markers or crayons.
5. Demonstrate what it is like to be trapped in grain while it is emptied.
6. Cut the bottom off a plastic gallon milk jug.
7. Turn the jug upside down and fill it with grain while the cap is on.
8. Place a small toy figure on top of the grain and place a container under the cup.
9. Remove the cap. As the grain quickly flows out of the jug, it will pull the toy figure along with it.

Assessment:

Students should understand the importance of safety around grain. Let them know that there are a lot of things going on while someone is unloading grain and it is important that children should be very careful. Having the students write their own rap song should indicate that they have some understanding of the consequence to what happens when you are not cautious around the farm.





FARM SAFETY RAP SONG

(The farm safety rap song was written by fifth graders from an Allison-Bristow school in Iowa. Their performed it for Barbara Bush when she visited Iowa as First Lady.)

Let me tell you about a story of a man and his grain.
Stepped in the bin, corn fell around him like rain.
It was a mistake, but it ain't no sin,
Suffocation in the grain bin.
Tractor on the shoulder late at night.
Loaded grain wagons; it was quite a sight.
No use trying to keep it on the shoulder,
Another farm vehicle tipped over.
This is a rap of farm safety for kids.
Listen up; you may learn something you never did.
If you don't stay alert,
Someone could really get hurt.

Find the rhyming words in the farm safety rap song above and underline them with matching colors. Write your own rap song using rhyming words such as the ones below.

care	warning	caution	safety
heed	look	alert	mind
notice	observe	advice	wariness

SAFETY ON THE FARM

Grades: 1-3
Subjects: Health
Montana Standards: Health 3
Time: 45 minutes

Objectives: Students will

- Recognize the dangers on the farm.
- Understand the importance of staying away from harmful items and situations.
- Describe hazards found on the farm.
- Identify safe play areas on the farm.
- Identify behaviors that lead to avoidance of injuries and fatalities.

Materials Needed:

- Animal costumes
- Montana Farm Bureau ABC teachers packet of activities

Keywords:

Hazards, injury, safety, environment, dangers, incidents, expose, chemicals, machinery, avoid

Brief Description:

The family farm is a great place, but it also holds potential for harm to the ones we want to protect the most, young children. The farm is a unique environment for children to live, play, work, and grow up. But agriculture is one of the most hazardous occupations, and farm children are routinely exposed to the same hazards as their parents and people working on the farm. Each year, hundreds of children are killed and thousands injured in farm-related incidents. The purpose of this lesson is to discuss with students the dangers on the farm.

Lesson:

The Farm Environment

1. Listen and read Always Be Careful On The Farm out of the Montana Farm Bureau teacher packet.
2. Have students complete the true and false worksheet out of the ABC activity book.
3. Can you identify the positive aspects of the farm environment?
   Example: animals, big buildings, open spaces.
4. Can students make a connection between positive aspects of farming and possible negative factors?
   Example: animals, even though fun to be around and cute can also bite, trample, and stomp. Big buildings can be fun to play around and hide in but they can fall or they might be exposed to harmful substances like chemicals and electricity. Wide open farm spaces provide an ideal play area but this isolation make lead to more difficulty obtaining help if needed in the case of an emergencies. Powerful equipment is interesting to watch but you can become entrapped, cut, or crushed by the machinery. Even death can occur.
5. Can students give other examples of positive and negative factors?
6. Can the students identify the primary hazards to them on their farm?
   Example: machinery, livestock, 4-wheelers, chemicals, lawn mowers, irrigation ditches.

Tractor Safety

7. Should the students ask the driver of the tractor for a ride?
8. Never play or hide under or around machinery like tractors.

Animal Safety

9. Animals, even friendly ones, can be unpredictable. Stay away from animals, especially large ones. Avoid animals with newborn or young, mothers can be very protective of their young and view a child as a threat. Stay calm, speak quietly, and move slowly when around animals so you don't scare them.
10. Let students know the signs that animals give us to show that we are in danger.
    Example: pawing the ground, snorting, raising hair, ears laid back.
11. Have the students pretend they are animals. This is more fun if they can dress up in costumes, such as ears on headbands and noses on elastic.

Safe Play Areas

12. It is important for children to have a safe play area. Have the students determine where it is safe to play. List the safe areas on the board.
    Example: in a fenced yard, in the house, close to an adult.
13. Have the students identify unsafe play areas. List the unsafe play areas on the board.
    Example: near farm machinery, near animals, barns, silos, grain bins, chemicals, shop.

Assessment:

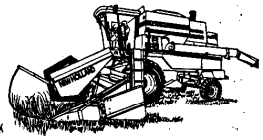
The family farm can be a dangerous environment for children if they and those in supervisory positions are not aware of the hazards. The most important thing for students to learn is to identify and stay away from those dangers. Other resources that are available are listed below:

Montana Farm Bureau Federation, Always Be Careful On The Farm activities.
The Adventures of Ready Rooster, Deere and Co., activity book.
Farm Safety 4 Just Kids

Name: _____

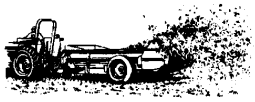
Farm Machinery and Structures

Plow



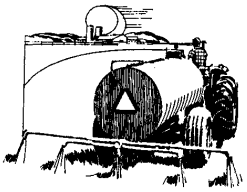
Combine

Irrigation System

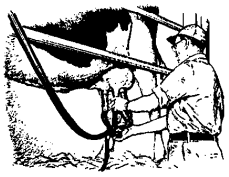


Spreader

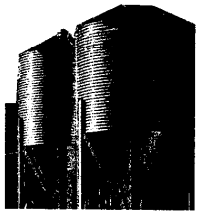
Hay Baler



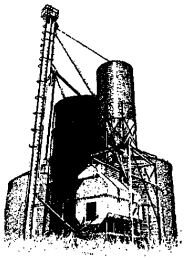
Sprayer



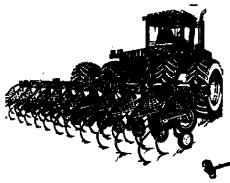
Milking Machine



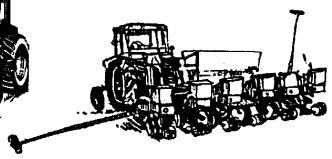
Grain Tank



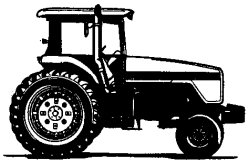
Silo



Cultivator



Planter



Tractor

VEGIE SALAD-FROM THE GARDEN TO YOU

Grades: K-3
Subjects: Science, Health & Language Arts
Montana Standards: Health Enhancement 1, 5, 6, and 7, Science 2, Literature 1
Approximate Time: 3-4 days

Objectives: Students will

- Familiarize students with the great number of vegetables available to us.
- Encourage students to sample the varied vegetables that are available during the salad lesson.
- Become aware of the different parts of the vegetables we eat (root, stem, leaf, flower, and fruit of the plant).
- Become aware of the vitamins obtained from vegetables for good nutrition.

Materials Needed:

- A Harvest of Color Growing a Vegetable Garden by Melanie Eclare in AMS Resource Library
- Varied vegetables for the salad
- Dressings
- Paper plates and bowls
- Plastic forks
- Seasonings
- Teacher made chart- Vegetables- root, stem, leaves, flowers, and fruit of the vegetable

Keywords:

Food guide pyramid, nutrition, fruit, vegetables

Brief Description:

The Food Guide Pyramid from the United States Department of Agriculture (USDA) displays how to eat a variety of foods for a healthy body. Our bodies will get the nutrients they need if we follow the Food Guide Pyramid. The Food Guide Pyramid tells us how many servings we need of each food group. It suggests that we eat six to eleven servings of bread; one serving per day of bread, one ounce of cereal, or a half cup of rice or pasta. In the next layer, the pyramid suggests that we eat three to five servings of vegetables and two to four servings of fruit; one serving of vegetables is one cup of raw leafy vegetables or a half cup of other vegetables. One serving of fruit is one medium apple, banana, or orange; a half cup chopped, cooked or canned fruit, or one-half cup of fruit juice. Up another level are the meat and dairy categories. We should eat two to three servings of meat, fish, poultry, eggs, dry beans, or nuts and two to three servings of milk, yogurt, and cheese. One serving of meat is two to three ounces of lean meat, one cup of dry beans, one egg, or four tablespoons of peanut butter. One serving of milk is one cup of milk or yogurt or one and one-half ounces of cheese. Oils, fats, and sweets are at the top of the Food Guide Pyramid. They should be eaten sparingly because they have little nutritional value and will store as fat if the excess energy is not used. This lesson is to contrast the proper diet and eating habits with the construction of an unbalanced pyramid representing the typical American diet today.

At the present time, there is much discussion about changing the design of the pyramid.

Lessons:

1. Read the book A Harvest of Color Growing a Vegetable Garden by Melanie Eclare. Discuss with the class the difference between a root, stem, leaf, flower, and fruit. Brainstorm vegetables for each category. Graph the vegetables in the appropriate column on the chart. Give each student a letter telling which vegetables to bring for our vegetable salad. Best to give the families two days notice. Have the students bring the vegetables washed and prepared for the salad. Have them leave one vegetable whole so that the other students can observe it later. Teacher will need to supply the less common vegetables.
2. Place vegetables on individual serving plates; encourage the students to sample some of each vegetable in their salad bowl. You could have a further discussion with the class as to which vegetables they liked or disliked.

   How many roots did you eat? Leaves? Stems? Fruits of plant? Flowers?
3. As a culminating activity for a nutrition unit, make a trip to a grocery store. Ask the grocer to explain where each vegetable or fruit was grown, stored, etc.

Assessment:

Have students make a booklet by folding paper. Have children brainstorm categories such as fresh, canned, frozen, cereals, pastas, bakery, sweets, dairy, meats, etc. Instruct students to either draw a picture or write the word representing several items in each category which they saw in the grocery store.

FUN NUTRITION SITES ON THE WEB

1. Kids Food Cyber Club
   http://www.kidsfood.org
2. KidsHealth
   http://www.kidshealth.org
3. Nutrition Café
   http://www.exhibits.pacsci.org/nutrition
4. Nutrition Expedition
   http://www.fsci.umn.edu/nutexp
5. Dole 5-A-Day
   http://www.dole5aday.com/
6. N.O.W.: Nutrition on the Web~for teens!
   http://library.advanced.org/10991/
7. Texas Calcium Website for Teens
   http://calcium.tamu.edu/
8. Milk: Where's Your Mustache?
   http://www.whymilk.com
9. Burger Town
   http://burgertown.kidscom/main/
10. Nutrition Navigator, Tufts University
    http://navigator.tufts.edu
11. Eating Disorders Awareness and Prevention
    http://members.aol.com/edapinc/home.html
12. American Anorexia/Bulimia Association
    http://member.aol.com/amanbu/index.html

A COOKIE GROWN ON A FARM?

Grades: K-3
Subjects: Health, Math, and Language Arts
Montana Standards: Math 5, Health Enhancement 1, 6 & 7, Reading 4 & 5
Approximate Time: 1 week

Objectives: Students will

- Come to understand a well balanced diet through discussions of the food pyramid.
- Encourage the development of good eating habits.
- Understand where individual food products fit into the pyramid.

Materials Needed:

- A Cow, a Bee, a Cookie, and Me by Meredith Hooper in the AMS Resource Library
- Ingredients for cookie recipe(recipe on book jacket)
- Food Guide Pyramid from the AMS trunk
- Large pieces of different colored butcher paper for the food pyramid collage
- Magazines with numerous food pictures-at least one for each child
- Fuel Up Your Tank worksheets-included

Keywords:

Food pyramid, balanced diet, fuel, food, nutrition

Brief Description:

The Food Guide Pyramid from the United States Department of Agriculture (USDA) displays how to eat a variety of foods for a healthy body. Our bodies will get the nutrients they need if we follow the Food Guide Pyramid. The Food Guide Pyramid tells us how many serving we need of each food group. See the table on the next page for details. This lesson is to contrast the proper diet and eating habits with the construction of an unbalanced pyramid representing the typical American diet today.

Lessons:

1. The teacher will display a large food pyramid poster in the front of the classroom and will lead a discussion on the pyramid. Explain each section of the pyramid. Make sure you discuss the servings necessary for a balanced diet. Provide the students with the large cut outs for the pyramid. Tell the class we are going to build a BIG Food Pyramid collage. Distribute magazines for children to cut out various foods. Point out the sweets pictures have to be small in size. Just lay pictures on appropriate sections. Divide class into five groups, all but the sweets. Teacher may model trimming and pasting for this section. Put the pyramid together after everything is glued on. These pieces may become a bulletin board at this point.
2. Lead a discussion about the importance of a well balanced diet; especially having breakfast before school. The teacher can make a comparison to fueling a car before beginning a trip to eating breakfast before school. Hand out the worksheet titled Fuel

Up Your Tank. Thoroughly explain the workings of the worksheet. Keep the sheet at school to be completed. The students will record what they ate for breakfast, lunch and dinner each day for a week.

3. The teacher will read and discuss the book A Cow, a Bee, a Cookie, and Me. Make and bake the cookies from the recipe on the book jacket.

Assessment:

1. After assembling, look at and discuss the food pyramid as a class.
2. After a week, have each child look at their car and analyze their fuel (food). How could they make better choices? Were their choices appropriate?
3. Students may complete the Jump-Start Your Day with Breakfast Word Search. Sheet is included.

GRAINS	**VEGETABLES**	**FRUITS**	**MILK**	**MEATS & BEANS**
Eat at least 3 oz of whole-grain cereals, breads, crackers, rice, or pasta every day 1 oz is about 1 slice of bread, about 1 cup of cereal, or ½ cup of cooked rice, cereal, or pasta	Eat more dark-green veggies like broccoli and spinach Eat more orange veggies like carrots and sweet potatoes Eat more dry beans and peas like pinto beans and kidney beans	Eat a variety of fruit Choose fresh, frozen, canned, or dried fruit Go easy on the fruit juice	Go low-fat or fat-free when you choose milk, yogurt, and other products If you don't or can't consume milk, choose lactose-free products and other calcium sources	Choose low-fat or lean meats and poultry Bake it, broil it, or grill it Vary your protein routine—choose more fish, beans, peas, nuts, and seeds
For a 2,000-calorie diet, you need the amounts below from each food group every day.				
Eat 6 oz.	Eat 2 ½ cups	Eat 2 cups	Get 3 cups (kids ages 2 to 8, 2 cups)	Eat 5 ½ oz.

Find your balance between food and physical activity

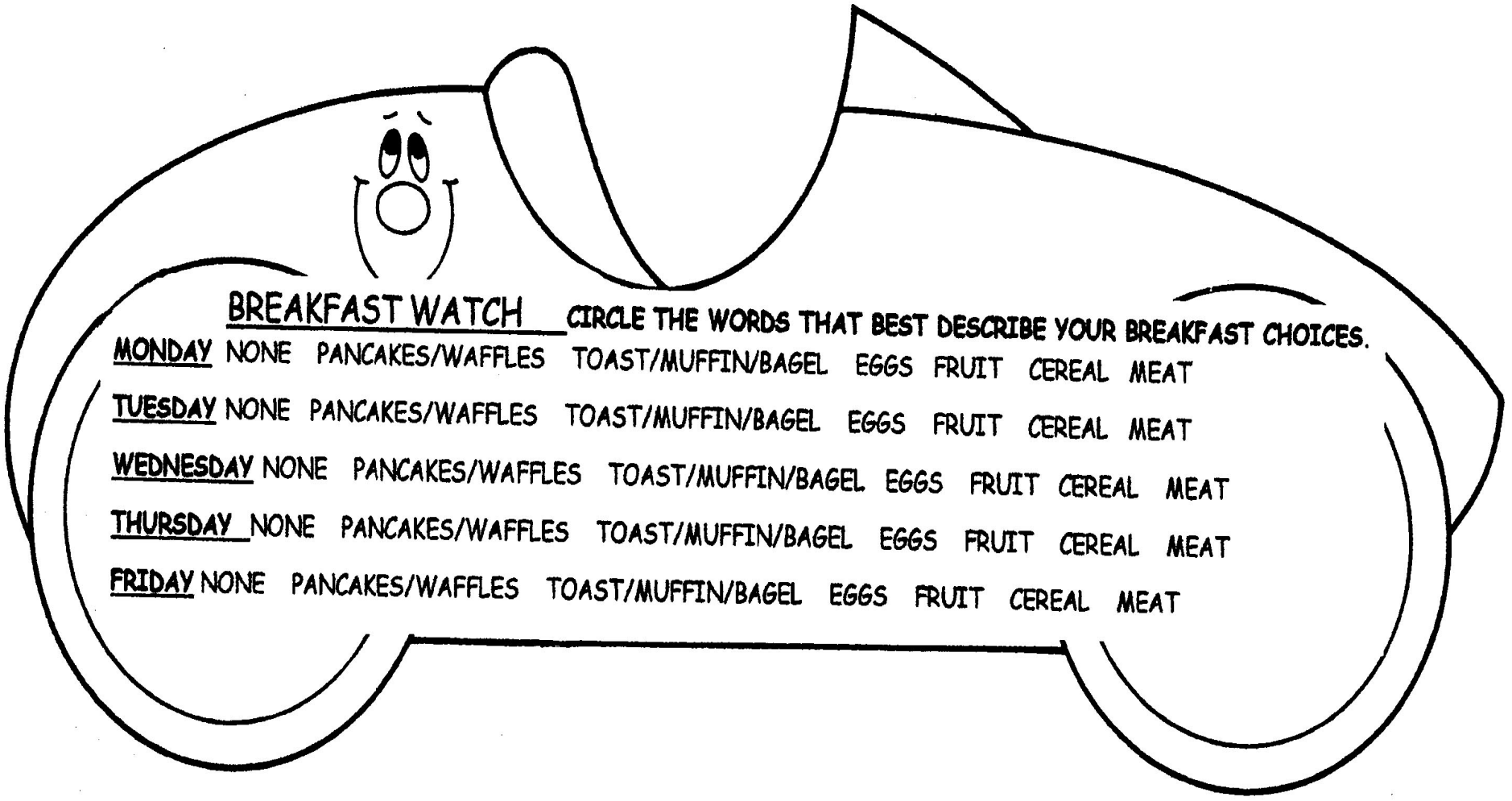
- Be sure to stay within your daily calories needs.
- Be physically active for at least 30 minutes most days of the week.
- About 60 minutes a day of physical activity may be needed to prevent weight gain.
- For sustaining weight loss, at least 60 to 90 minutes a day of physical activity may be required.
- Children and teenagers should be physically active for 60 minutes every day, or most days.

Know the limits on fats, sugars, and salt (sodium)

- Make most of your fat sources from fish, nuts, and vegetable oils.
- Limit solid fats like butter, margarine, shortening, and lard, as well as food that contain these.
- Check the Nutrition Facts label to keep saturated fats, trans fats, and sodium low.
- Choose food and beverages low in added sugars. Added sugars contribute calories with few, if any, nutrients.

U.S. Department of Agriculture
Center for Nutrition Policy and Promotion
April 2005

USE THE OVERHEAD TO ENLARGE EACH SECTION OF THE PYRAMID TO BULLETIN BOARD SIZE.



BREAKFAST WATCH

CIRCLE THE WORDS THAT BEST DESCRIBE YOUR BREAKFAST CHOICES.

MONDAY NONE PANCAKES/WAFFLES TOAST/MUFFIN/BAGEL EGGS FRUIT CEREAL MEAT

TUESDAY NONE PANCAKES/WAFFLES TOAST/MUFFIN/BAGEL EGGS FRUIT CEREAL MEAT

WEDNESDAY NONE PANCAKES/WAFFLES TOAST/MUFFIN/BAGEL EGGS FRUIT CEREAL MEAT

THURSDAY NONE PANCAKES/WAFFLES TOAST/MUFFIN/BAGEL EGGS FRUIT CEREAL MEAT

FRIDAY NONE PANCAKES/WAFFLES TOAST/MUFFIN/BAGEL EGGS FRUIT CEREAL MEAT

JUMP-START YOUR DAY WITH BREAKFAST
--WORD SEARCH—

Breakfast fills your "empty tank" to get you moving after a long night without food. Breakfast can help you do better in school, too! You can eat anything for breakfast, cold cereal with fruit and milk, whole-grain waffles with yogurt and juice or even pizza or spaghetti! Can you find these 25 words?

The words can read up, down, or across from left to right or right to left!

B D H A M A R E M U F F I N S S D M A E K L J C

X Y L R E Z A B T A Z Z I P E O A T M E A L C T

W A E D E G A S U A S M L J H O B A C O N I Z E

P B A C D M M O P R Q I H S W N B C E N O U P E

A O R M E K A E T S P R E G G S S G R I T S T M

R U N H G O U R T D T G I A S R F E E P E R G O

H E T S R I G I I G N Y N I E S J J A A M M Y K

E N E R G Y U C A A E P U E K O U W L E E M A W

T K T S E C A A R P R P T W A U I A Z O L Q U H

L W O L S L L O Y T T I R E C Y C F P A O S T L

I F E I L E M I L K O N I E N A E F F F N L B A

E S B T F E A T E R A U T E A P B L A C Q U R P

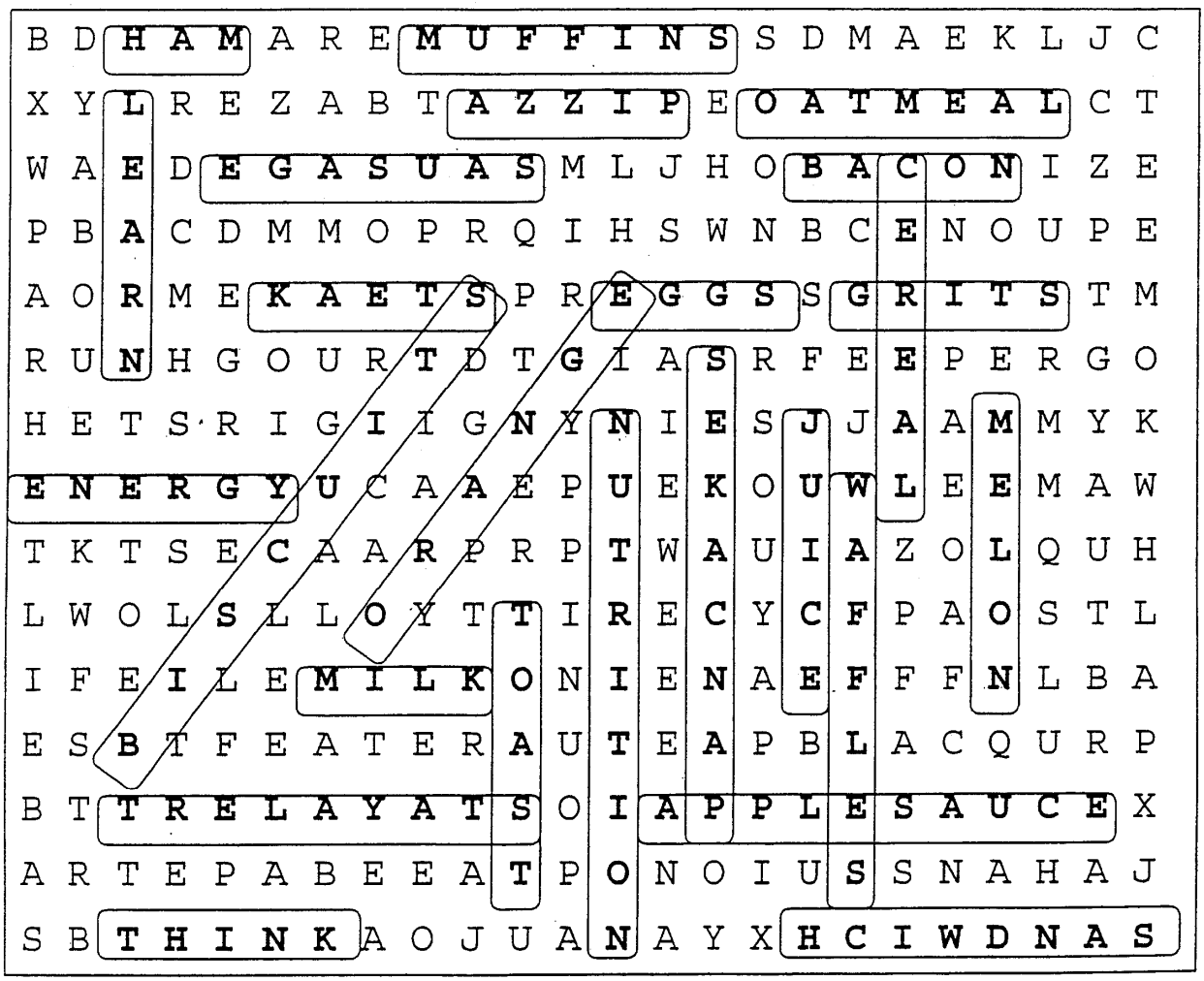
B T T R E L A Y A T S O I A P P L E S A U C E X

A R T E P A B E E A T P O N O I U S S N A H A J

S B T H I N K A O J U A N A Y X H C I W D N A S

PANCAKES
EGGS
CEREAL
STEAK
WAFFLES
MELON
PIZZA
MUFFINS
GRITS
SAUSAGE
OATMEAL
SANDWICH
BACON
JUICE
HAM
NUTRITION
BISCUITS
TOAST
ENERGY
LEARN
THINK
APPLESAUCE
MILK
ORANGE
STAY ALERT

WORD SEARCH ANSWERS




Livestock

CATTLE ON THE RANCH

Grades: K-2
Subjects: Language Arts, Vocational, Art
Montana Standards: Art 6, Literature1, Reading 4, Careers & Vocational Technical 1
Approximate Time: 1 week; 30 Minutes each day and ½ day for field trip

Objectives: Students will

- Become familiar with the terminology used in connection with cattle ranches and farms.

Materials Needed:

- The book Life on a Cattle Farm by Judy Wolfman
- Magazines with pictures of cattle.
- U. S. Beef Breeds poster from Ag in Montana trunk
- Video "Growing in the Country" from AMS Library

Keywords:
pasture-grazing land, crop land-land used to grow & harvest food for people or animals, summer range-owners lease, or permit land used to feed cattle in the summer, angus-black or dark red beef animal, Hereford-red with white face, crossbreeds-two different breeds (ie: Angus/Hereford) will be a black, white-faced calf, and other breeds)

Brief Description:

A cattle ranch is a large area of land where the cattle roam around to graze (eat) in the pasture. Calves are usually born in the state of Montana from January to April. Throughout the winter and spring the cows are fed good quality hay and need protection from the weather during this time of giving birth (calving). Births are usually single but sometimes a cow can give birth to twins. In late spring cattle are turned out to summer range, sometimes in the mountains and occasionally on the plains or valley pastures, to graze. It is very important to check these cows frequently throughout the summer. You must check for availability of water and salt as well as for any illnesses the cattle may acquire. Just before winter, there is a fall roundup. Cowboys (ranch workers) gather the cattle. There are different genders of cattle. A cow is a female who has had a baby (calf). The bull is a male who is the father of the calf. A heifer is a female who has not had a calf. A steer is a male who cannot father babies. In the fall the calves are separated from the cows and bulls. The calves are shipped to market where they are fed large amounts of hay and grain so that they will grow before they are butchered and processed into different cuts of meat and sent to the market for sale to the public. The cows are then separated from the bulls for the winter and each is fed hay for the winter. Beef cattle produce many different cuts of meat. Not only does it taste good, but also it provides energy. Beef is full of vitamins and minerals that your body needs every day. Montana raises about 2,750,000 head of cattle each year.

Almost the entire beef animal can be used to benefit man in some way. From a typical 1,000 pound steer, 400 pounds is used for beef that we eat and the remaining 600 pounds are used as by-products.

In this lesson students will be introduced to farm and ranch terminology. They will become aware of the workings of ranch life pertaining to cattle.

Lesson:

1. Read and discuss parts of the book Life on a Cattle Farm by Judy Wolfman.
   Go over terms related to farm and ranch life. (ie: cow, bull, calf, heifer, steer, cowboy, and beef)
2. Find and cut out different breeds of cattle. Place all of the pictures of Angus cattle on one sheet, all of the Hereford cattle on another sheet, etc.
3. Complete the work sheet appropriate for your grade level. There are two versions of the word find provided.
4. Sing Cattle song to the tune of Bingo. Words are attached.
5. Visit a local cattle ranch in your area.

Assessment:

Provide the students with a list of farm and ranch terms. Instruct the students to draw and label a picture of a cattle ranch.

TERMS TO BE PROVIDED:

pasture	water	cow
calf	bull	cowboy
fence	grass	ranch
farm	beef	hay

CATTLE SONG

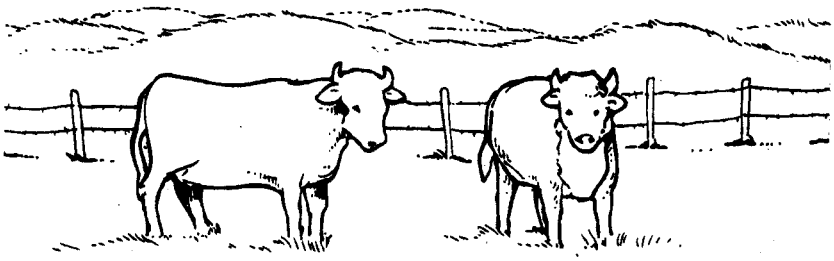
TO THE TUNE OF BINGO

The cowboy rode
Out on the range
And rounded up
The cattle
Cat tle
Cat tle
Cat tle
And rounded up the cattle.

LIFE ON A RANCH

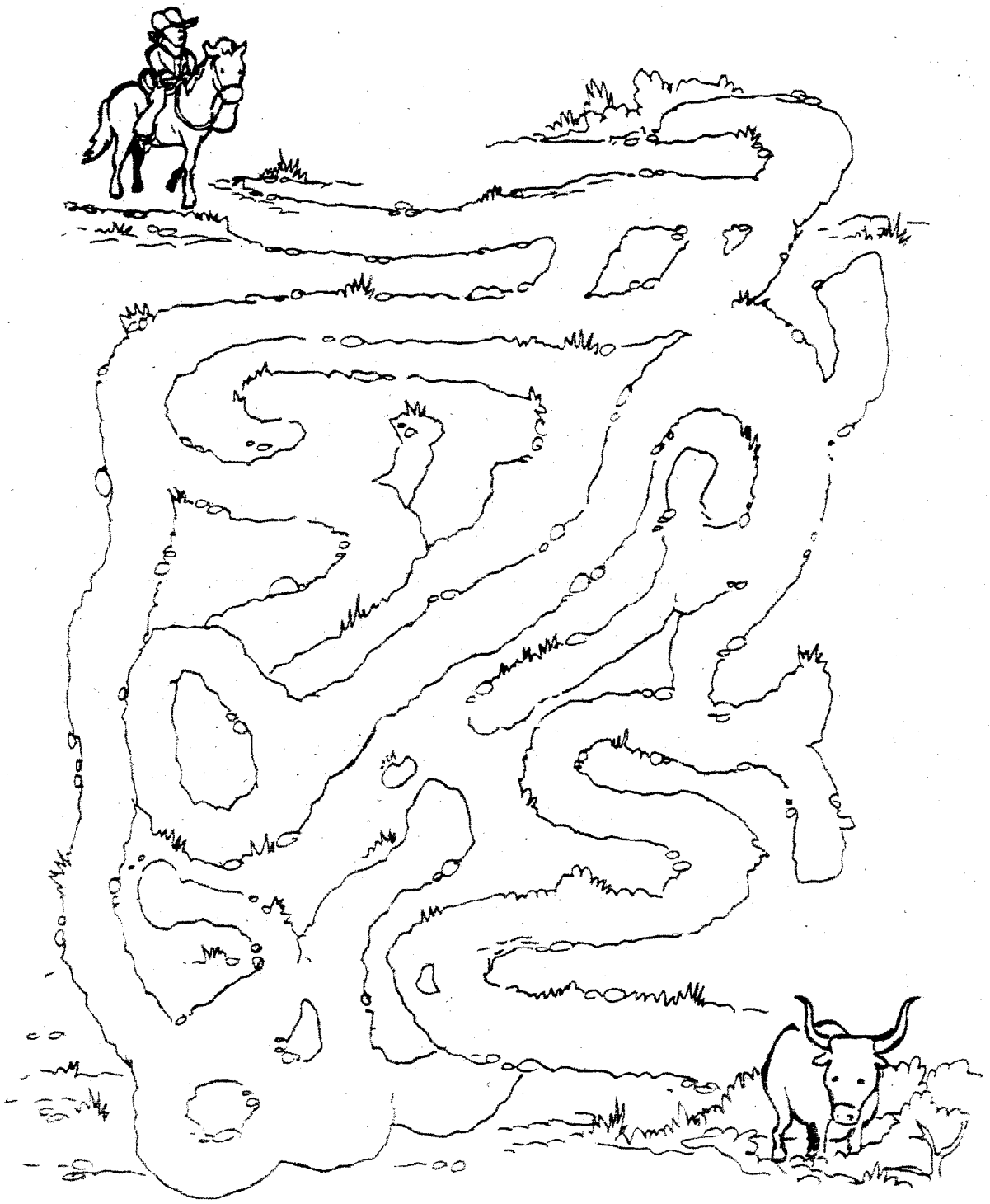
Y	O	B	W	O	C	P	Y	R	N
B	U	S	C	O	A	Z	A	O	N
U	E	O	S	S	C	R	H	Y	Y
L	L	O	T	A	W	A	T	E	R
L	U	U	H	E	R	B	L	L	Y
W	R	U	C	X	O	G	F	F	V
E	O	N	N	R	X	A	Y	Y	E
X	E	C	A	D	R	I	S	N	L
F	A	Y	R	M	F	E	E	B	D
A	R	J	E	K	H	L	L	G	T

BEEF	BULL	CALF
COW	COWBOY	FARM
FENCE	GRASS	HAY
PASTURE	RANCH	WATER



Name _____

Help Bronco Billy find the lost cow. Draw a green line to show him which way to go.



WE BUY BY-PRODUCTS

Grades: 2 & 3
Subjects: Science and Social Studies
Montana Standards: Social Studies 1, Science 6
Approximate Time: 4 days

Objectives: Students will

- Introduce term of by-product.
- Become aware of by-products of beef cattle
- Understand that almost every part of the animal is used in some way
- Show an understanding of "vertical", "horizontal", and "diagonal" while playing Bingo

Materials Needed:

- Beefo Bingo game board for each student
- By-products board pieces for each student
- Work sheet matching pictures and words
- AMS Treasure Chest Pamphlet: When a Cow is More than a Cow

Keywords:

By-product-anything made from beef animals other than meat
raw product- those materials that <u>have not</u> been processed
manufactured product-those materials that <u>have</u> been processed

Brief Description:

Almost the entire beef animal can be used to benefit man in some way. From a typical 1,000 pound steer, 400 pounds is used for beef that we eat and the remaining 600 pounds are used as by-products.

These are some common types of beef: pot roast, sirloin steak, ground beef, rib eye steak, and tenderloin steak. Beef is a good source of protein (which builds, maintains, and repairs body tissues), iron (which helps the red blood cells carry oxygen to body cells and tissues), zinc (which is a mineral used for growth and maintaining the immune system), and B-vitamins (which promote healthy skin, keep the nervous system healthy, and are important for digestion and metabolism).

Beef by-products are anything made from a beef animal other than meat. You probably use more beef by-products than you think! Here are some examples:

<u>Bone, Horn, Hooves, and Gelatin</u>
Combs, gelatin candy (Gummy Bears), marshmallows, mayonnaise, gelatin, photographic film, steel ball bearings, fine bone china, pet food, and vitamin capsules/gel coatings.

<u>Hide and Hair</u>
Insulation, paintbrushes, glue for bookmaking and band-aides, clothes, shoes, luggage, saddles, furniture, automobiles, volleyballs, basketballs, and baseball gloves.

<u>Fats and Fatty Acids</u>
Shampoo, soaps, shaving creams, cosmetics, deodorants, candles, crayons, floor wax, detergents, hydraulic brake fluid, plastics, insecticides, paints, perfumes, and synthetic rubber.

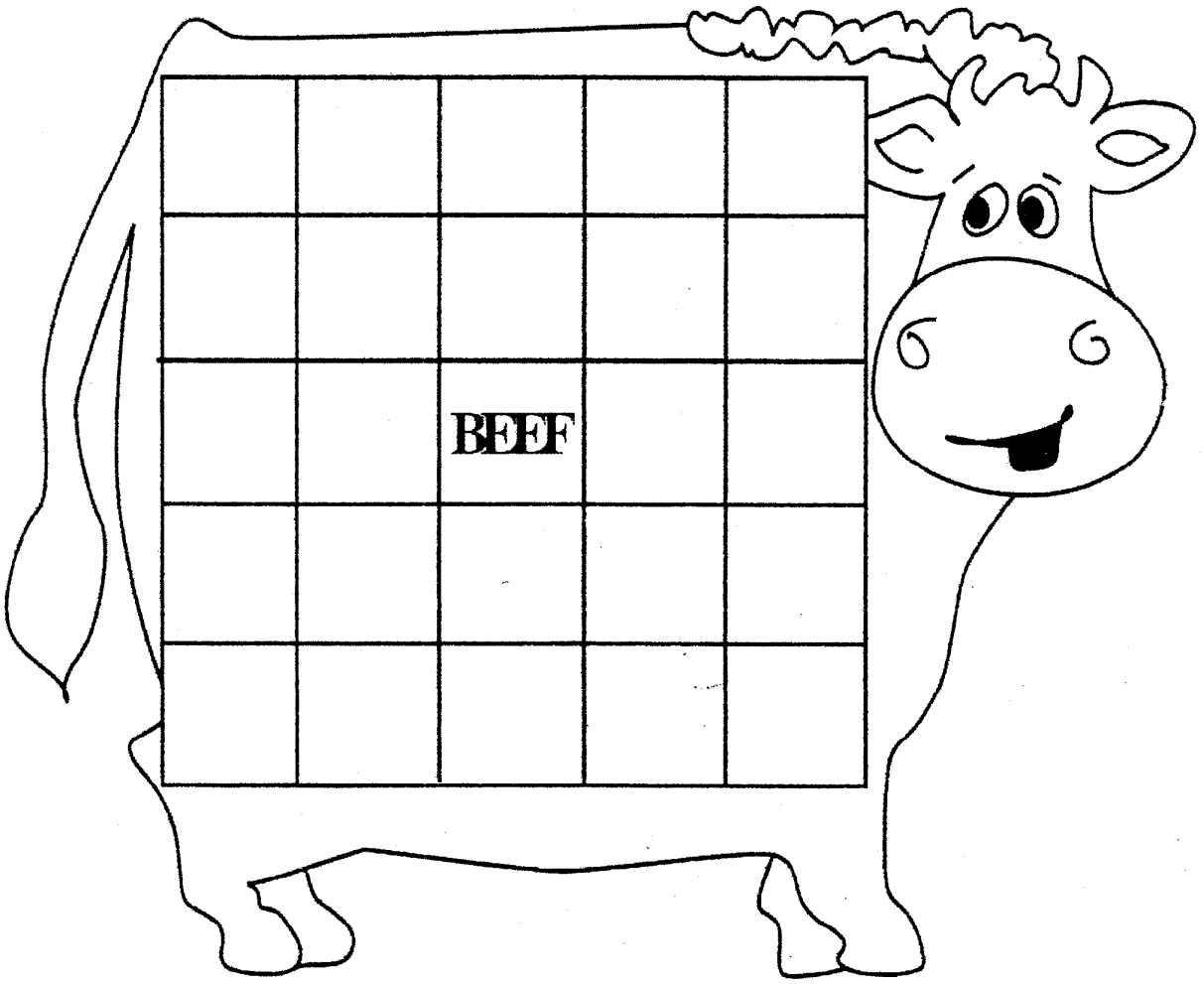
Lesson:

1. Teach the by-products from beef cattle. Discuss raw products being manufactured into the products we buy. Give students the by-products board piece sheet to discuss those specific products.
2. Cut out by-products board pieces. Choose 25 pieces to glue on to the Beefo Bingo card.
3. Play Beefo Bingo game.
4. Use the picture/word by-product worksheet.

Assessment:

Provide a very large outline drawing of a beef animal on butcher paper. Provide magazines for students to cut out pictures of by-products that were previously discussed. Paste these pictures on the outline drawing.

Beefo Bingo



To be used with Beef Bingo

By-Products Board Pieces

Insecticide	Paints	Brake Fluids	Machine Oil	Tires	Car Polish
Feed	Steel Ball Bearings	Cake Mix	Marshmallows	Pasta	Mayonaise
Floor Wax	Soap	Gelatin	Leather Chairs	Candy	Candles
Thread	Glue	Leather Shoes	Baseballs	Footballs	Basketballs
Cosmetics	Deodorant	Shoe Cream	Shaving Cream	Iron Pills	Insulin
Emery Board	Bandages	Luggage	Cellophane	Ceramics	Detergent
Textiles for car upholstery	Car Wax	Piano Keys	Paint Brushes	Perfume	Vitamine B_{12}
Bone China	Pet Food	Chewing Gum	Photographic Film	Oleo Margarine	Linoleum

Draw a line to match the correct picture and word. These products are each made from parts of a cow.

The Bones and Hooves help make:

Camera film

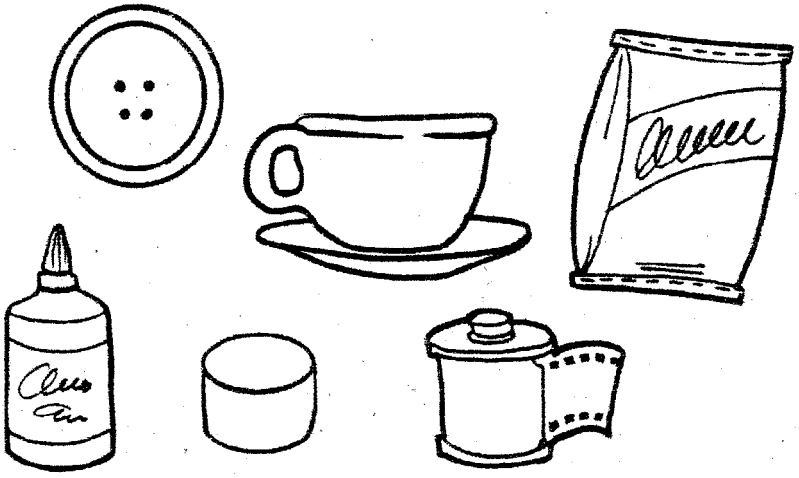
Buttons

Dishes

Glue

Fertilizer

Marshmallows



From the Hide and Hair we can make:

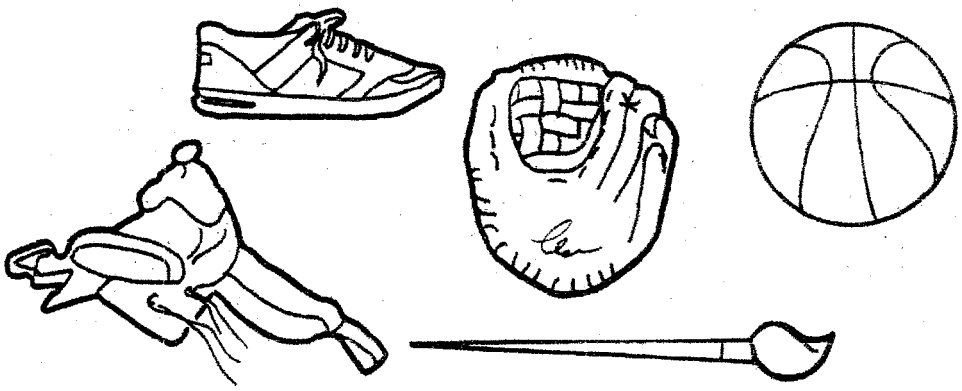
Baseball glove

Basketball

Paint brushes

Shoes

Saddle



Fats from the cow help us make:

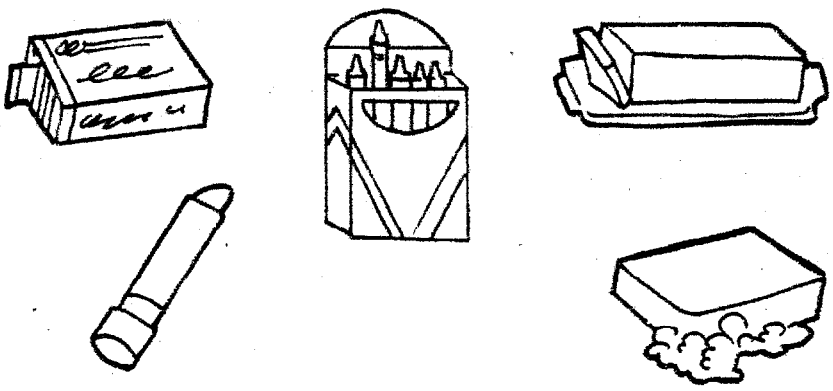
Crayons

Margarine

Soap

Chewing gum

Lipstick



HOW THE CHEESEBURGER FILLS A PYRAMID

Grades: 3
Subjects: Health, Language Arts
Montana Standards: Health Enhancement 1, Reading 1, Speaking & Listening 1
Approximate Time: 1 Day

Objectives: Students will

- Begin to understand the food groups of the food pyramid and how a cheeseburger fits into that pyramid.

Materials Needed:

- Poster of the USDA Food Pyramid
- Local Montana CattleWomen Group
- Small booklet BEEF IT'S WHAT'S FOR DINNER from the AMS trunk

Keywords:

Food pyramid, beef, condiments, nutritious

Brief Description:

Most burgers are made from ground beef and some kind of bread. Ground beef can be made from just about any part of a beef animal. Ground beef or ground sirloin has the least amount of fat. The average hamburger patty contains between 16 and 19 grams of fat. Ground beef is high in protein, containing 18 amino acids, eight of which are essential to human life. You can make your hamburger even more nutritious by choosing different breads and condiments. Whole-wheat buns add nutritional value.

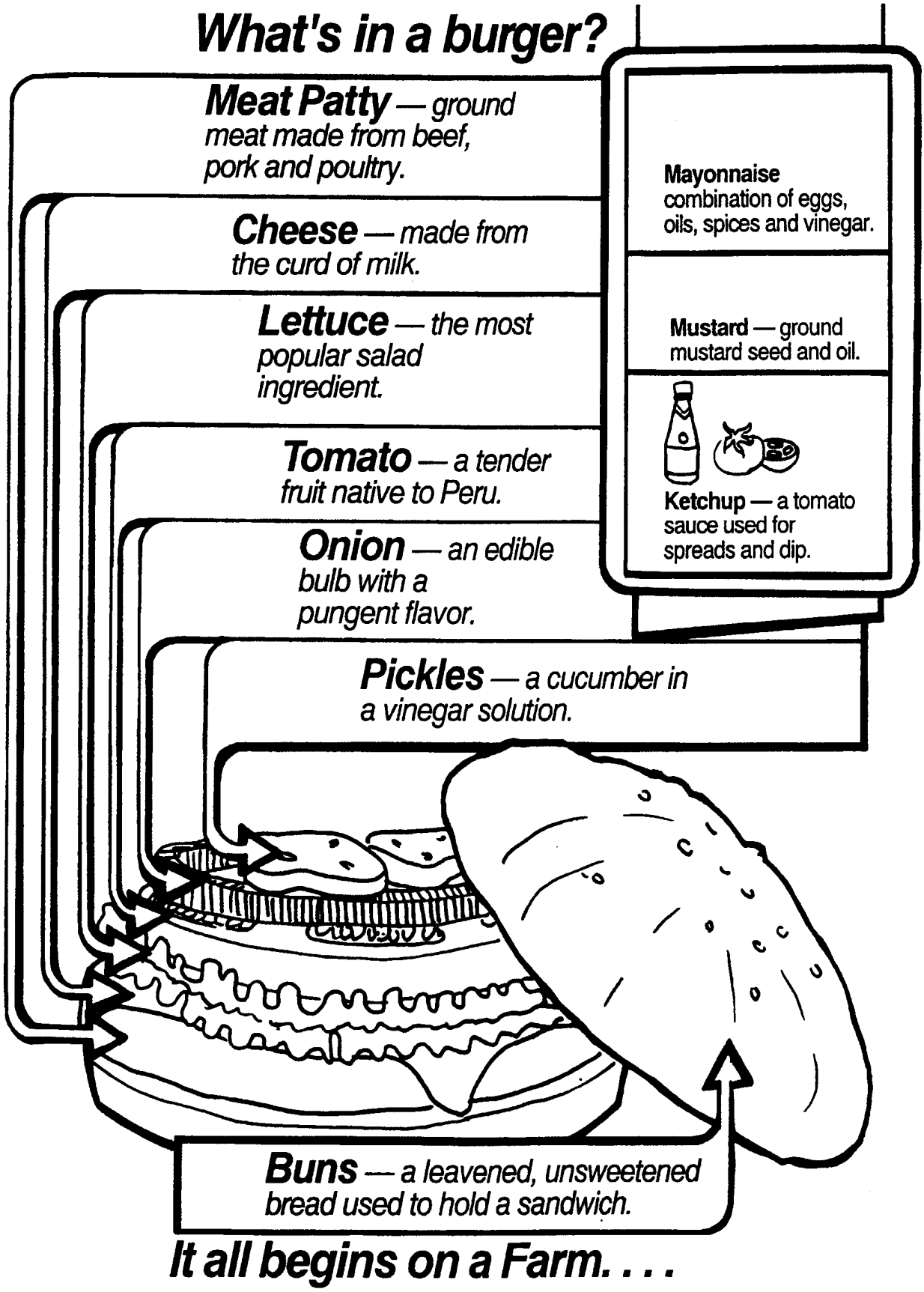
The average American eats about 64 pounds of beef each year, more than the people in any other country. Nearly one-half of that comes from ground beef and about one-fourth in the form of hamburgers.

Lesson:

1. In a group, with a large poster of the food pyramid, the teacher will introduce the sections of the pyramid. Then pass out the What's in a Burger sheet. Have a group discussion as to where all the condiments of the burger will fit into food pyramid. Children may color the What's in a Burger sheet. Referring to the last statement on this sheet (It all begins on a Farm) the teacher could lead a discussion about how each condiment was raised on a farm and tended by many workers and a farmer.
2. Arrange and invite a representative from the CattleWomen group to your school to present the Cheeseburger program to the class. Allow about 1 hour for this presentation.
3. Review the food groups and have children complete the Build a Burger worksheet.

Assessment:

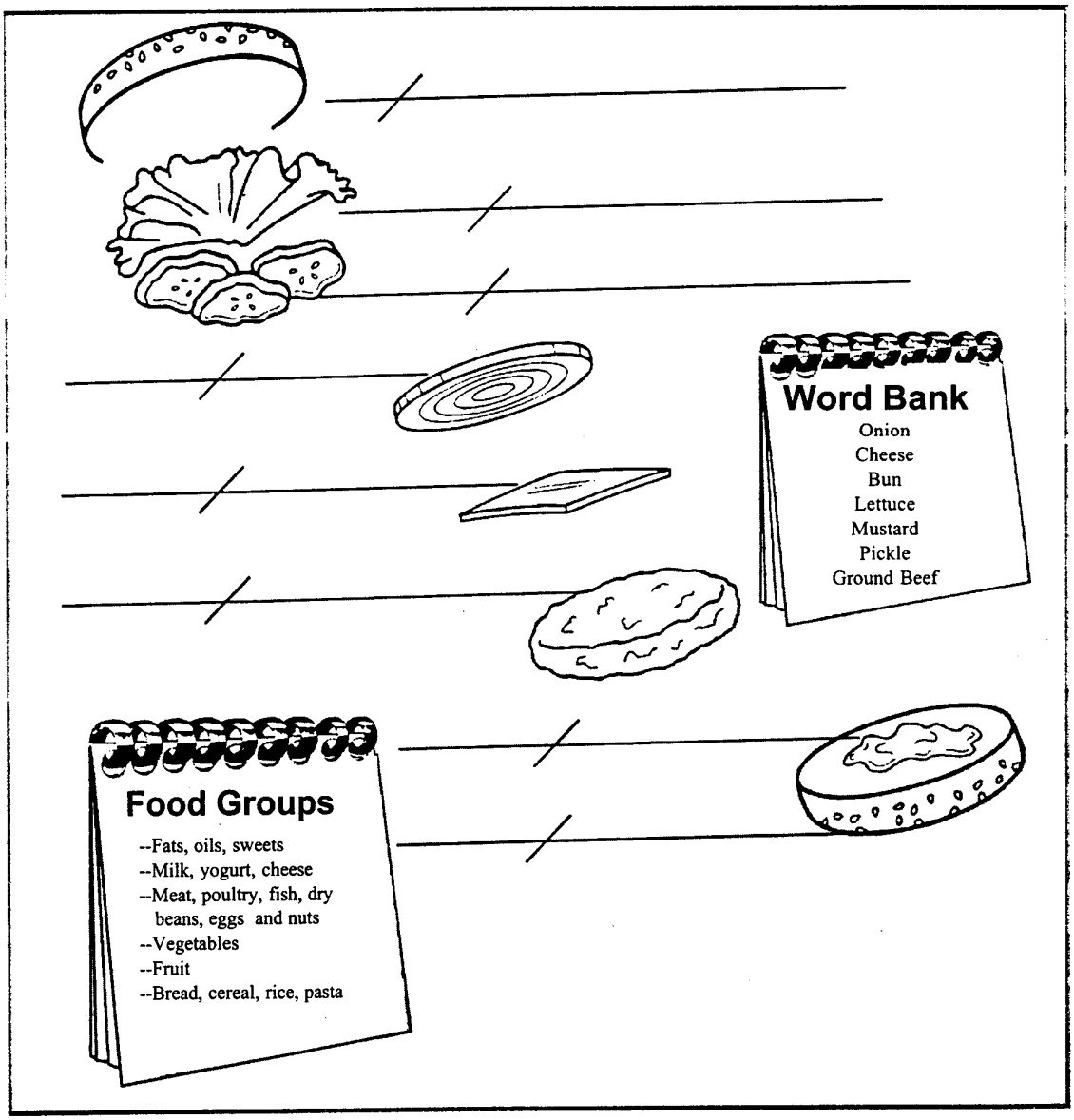
Give students the page with the food guide pyramid and the food group sheet. Have the students place the parts of the burger on to the pyramid by either drawing or writing the word.


What's in a burger?
Meat Patty — ground meat made from beef, pork and poultry.
Cheese — made from the curd of milk.
Lettuce — the most popular salad ingredient.
Tomato — a tender fruit native to Peru.
Onion — an edible bulb with a pungent flavor.
Pickles — a cucumber in a vinegar solution.
Mayonnaise combination of eggs, oils, spices and vinegar.
Mustard — ground mustard seed and oil.
Ketchup — a tomato sauce used for spreads and dip.
Buns — a leavened, unsweetened bread used to hold a sandwich.
It all begins on a Farm. . . .

Name _____

Build a Burger

Usually, a cheeseburger has products from all the food groups. Can you identify the parts of this cheeseburger? In the left blank, write the name of the cheeseburger part. In the right blank, list the food group it belongs to. Color the cheeseburger.



BURGER BUILDER

A V N Z C C L A M E T T N D C

R I Q M H M D S S U N R Z R O

C L S E I J Z I X M E Z T A Z

O U E E H C A L C O M R P T O

S S C F I N Q W S N N G J S N

E E Z U N T O M A T O E S U I

B O I O M B T B E A R I H M O

F U Y R M B L A P N I F D M N

N A R F F E E U P A V I N R S

M I E G T H H R V I N E G A R

H E A T E C C B U N E X N F T

B L U R T R A N S E L K C I P

N C U E G O G H E L R V Y K I

E M K P Y I X Z V R U I T V E

S E C I P S M N Y W F P V J W

BEEF
BUN
BURGER
CHEESE
CUCUMBER
ENVIRONMENT
FARM
FRENCHFRIES
GRAIN
KETCHUP
LETTUCE
MAYONNAISE
MONTANA
MUSTARD
ONIONS
PATTIES
PICKLES
SPICES
TOMATOES
VINEGAR

FIVE DAIRY COWS

Grades: K-3
Subjects: Science, Math, and Health
Montana Standards: Science 3, Math 6, and Health 1
Time: 45 minutes

Objectives: Students will

- Make finger puppets and participate in a finger play.
- Understand the importance of calcium in their diet.

Materials Needed:

- Variety of dairy products
- Plates
- Spoons
- Napkins
- Color crayons
- Tape
- Scissors
- Finger puppet patterns
- Five Dairy Cows finger play sheet

Keywords:

Puppet, dairy, products, survey, taste, texture, calcium

Brief Description:

Milk and other dairy foods – such as cheese, yogurt, and frozen yogurt – provide a lot of calcium and other nutrients. Foods that have a lot of calcium are good to eat as a snack or as part of a meal. Calcium is important because it aids in the development of strong bones and teeth and assists in muscle function. Adults need calcium to keep bones healthy. Insufficient calcium in the diet is one of the factors that may be associated with increased risk of a crippling bone disease called osteoporosis. Osteoporosis occurs when bones become so thin and brittle that they break easily.

Lesson:

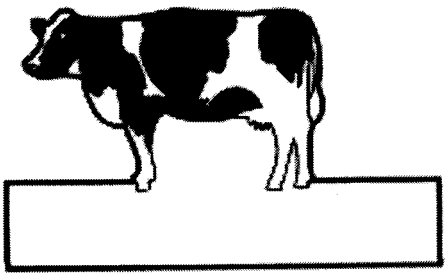
1. Place all of the cow finger puppets on one hand and five different dairy food puppets on the other hand.
2. Tell the students they are going to meet five special friends, and these friends want boys and girls to grow up to be strong and healthy.
3. Do the "Five Dairy Cows" finger play.
4. Give each student two finger puppet patterns- one cow and one dairy product. Have them cut, color and assemble the finger puppets.
5. Have the students identify what their dairy product is.
6. Repeat the finger play. This time, have students "pop up" their finger puppets at the appropriate time as you read the play.
7. After you're finished with the finger play have the dairy products on the table for the students to eat.
8. Take a survey. One the board make a chart; mark each column with the name of the food.
9. Ask students to raise their hand if they liked the food tasted. Have students help you count how many "likes" there are. Record the number in the column by using bars or pictures.

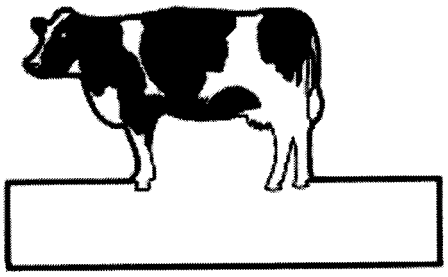
Assessment:

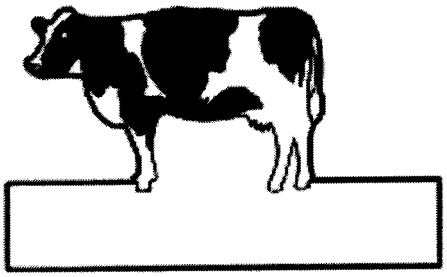
Discuss the chart, talking about how many more people "like" or "don't like" the food. Congratulate the students for taking a taste. Remind them that sometimes they will not like a new taste, and that's okay. What is important is for the students to be "food tasters" and to always give nutritious foods a try.

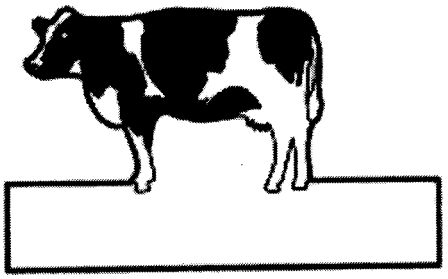
Resources: National Dairy Council

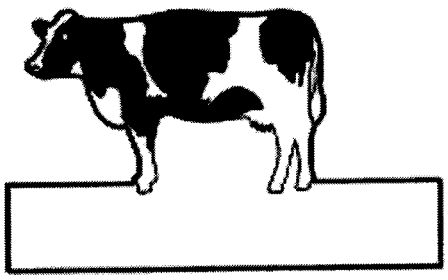
FINGER PUPPET PATTERNS

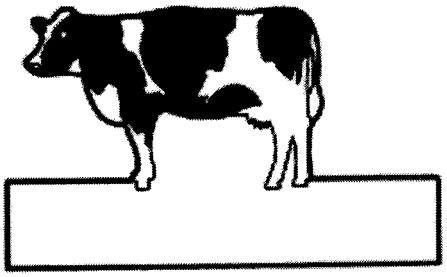


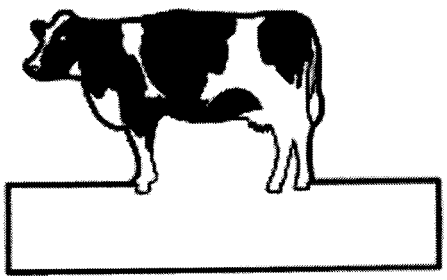


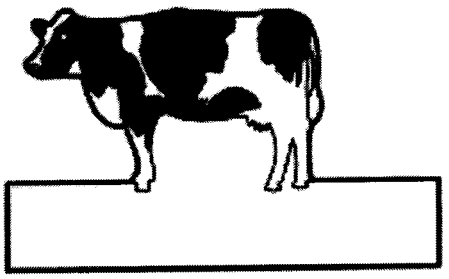


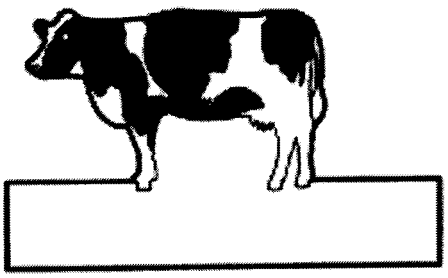


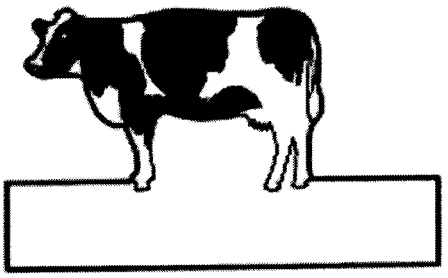




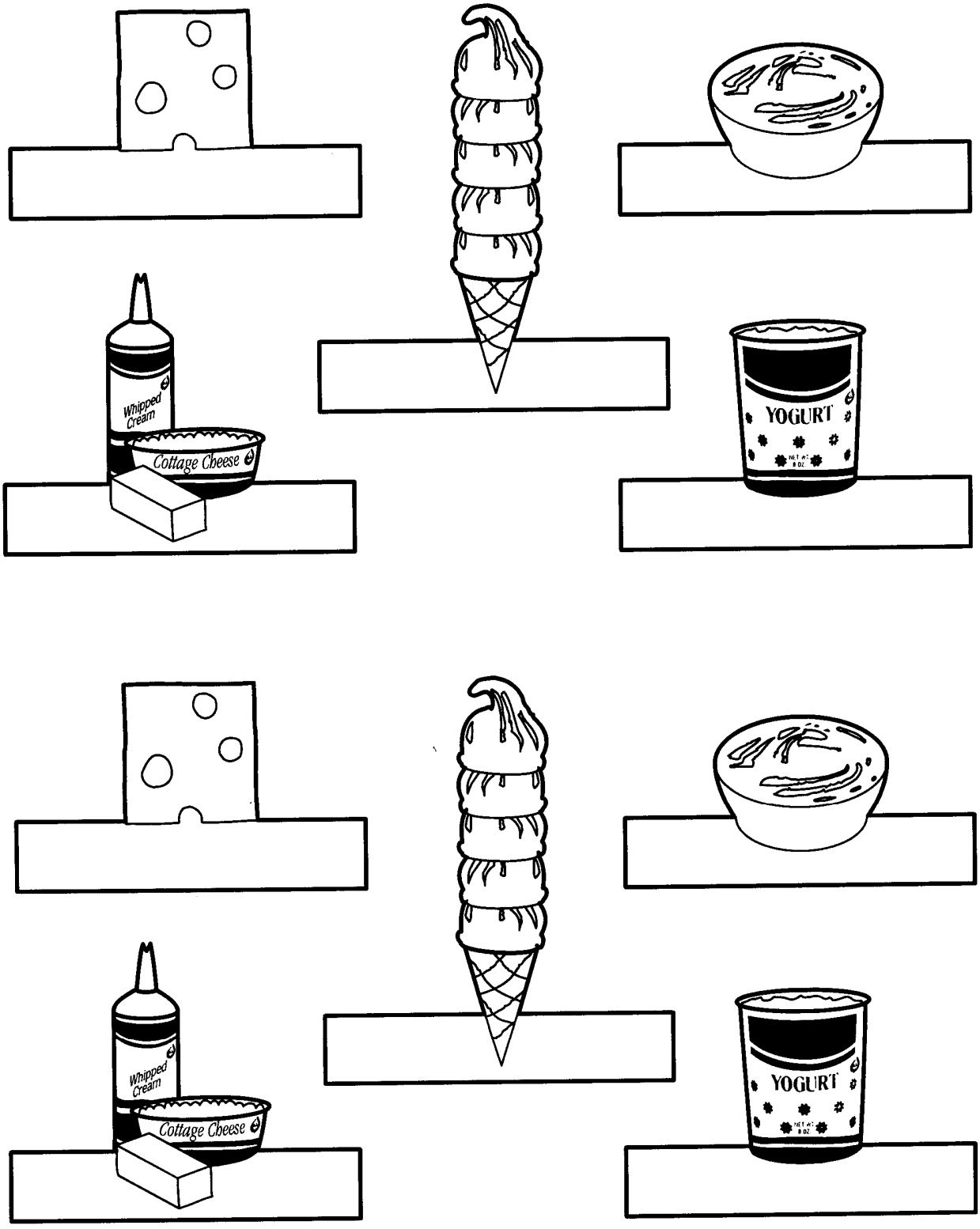








FINGER PUPPET PATTERNS



FINGER PUPPET PATTERNS

Five friendly dairy cows *Were eating ice cream cones,* *Trying to think of how to give* *All kids strong teeth and bones.*	Pop up all five dairy cows. Curl fingers toward each other and nod the heads, so it looks like the cows are talking with each other.
So the five friendly dairy cows *On a bright and sunny day,* *Planned a list of dairy treats* *To make without delay.*	Put the cows back down.
The first cow said, "With my milk *I'll make a tray of cheeses."*	Pop up the thumb cow. Pop up the cheese.
The second cow said, "With my milk *I'll make pudding! It always pleases."*	Pop up the pointer finger cow. Pop up the pudding.
"My milk," said a third cow, "will make *Cottage cheese, butter, and cream."*	Pop up the middle finger cow. Pop up the cottage cheese, butter, whipping cream.
"My milk," said the fourth cow, "will make *Yogurt that's like a dream."*	Pop up the fourth finger cow. Pop up the yogurt.
The fifth cow thought, and thought, and thought, *And then she thought some more,* *Finally she said, "With my milk,* *I'll make ice cream treats galore.* *I'll make vanilla, peach, and chocolate* *And of course some coconut,* *Strawberry and butter pecan,* *And finally some pistachio nut."*	Pop up the baby finger cow. Pop up the ice cream cone. Put the dairy products down.
The dairy cows went to sleep *And had dreams that were so sweet,* *Of girls and boys throughout the land* *With very strong bones and teeth!*	Have the cows stretch. Put the cows down.

USES OF MILK

Grades: K-3
Subjects: Science, Language Arts and Social Studies
Montana Standards: Science 2 & 3, Social Studies 6, Reading 1 & 4
Time: 45 minutes and 2 days for drying

Objectives: Students will

- Make ice cream.
- Learn about the folklore behind ice cream.
- Understand the industrial uses behind milk and make polymers.

Materials Needed:

- Small zip lock bags
- Large zip lock bags
- Plastic spoons
- Whole milk
- Sugar
- Vanilla
- Ice cubes
- Salt
- vinegar

Keywords:

Plastic, industrial, polymer, molecules, knead, rubbery, casein, monomers, chemical, characteristics, folklore, skeptical, freeze, history

Brief Description:

It is likely that ice cream was not invented, but rather came to be over many years. Here are a couple folklores to describe to your students how ice cream came to be.

Years ago, Charles I of England hosted a sumptuous state banquet for many of his friends and family. The meal, consisting of many delicacies of the day, had been simply superb but the "coup do grace" was yet to come. After much preparation, the King's French chef had concocted an apparently new dish. It was cold and resembled fresh-fallen snow but was much creamier and sweeter than any other after-dinner dessert. The guests were delighted, as was Charles, who summoned the cook and asked him not to divulge the recipe for his frozen cream. The King wanted the delicacy to be served only at the royal table and offered the cook 500 pounds a year to keep it that way. Sometime later, however, poor Charles fell into disfavor with is people and was beheaded in 1649. But by that time, the secret of the frozen cream remained a secret no more. The cook, named DeMirco, had not kept his promise.

The most popular story is of Marco Polo (1254-1324). He saw ice cream being made during his trip to China, and on his return, introduced them to Italy. The myth continues with the Italian chefs, Catherine de'Medici taking this magical dish to France when she went there in 1533 to marry the Duc d'Orleans, with Charles I rewarding his own ice-cream maker with a lifetime pension on condition that he did not divulge his secret recipe to anyone, thereby keeping ice cream as a royal prerogative.

In 1774, a caterer named Phillip Lenzi announced in a New York newspaper that he had just arrived from London and would be offering for sale various confections, including ice cream. Dolly Madison, wife of U.S. President James Madison, served ice cream at her husband's Inaugural Ball in 1813.

Commercial production of ice cream was begun in North America in Baltimore, Maryland, in 1851, by Mr. Jacob Fussell, now known as the father of the American ice cream industry. About 1926 the first commercially-successful continuous process freezer was perfected. The continuous freezer, developed by Clarence Vogt, and later ones produced by other manufacturers, has allowed the ice cream industry to become a mass producer of its product.

Milk is not only used to make ice cream but it has other uses as well, which are called industrial uses. The first plastics were made from natural sources such as milk, trees, and plants. Plastics are made through a process of polymerization. In this process, molecules called monomers combine with each other to form larger molecules called polymers. These unique man-made polymer chains give plastics their special characteristics.

Lesson:

1. Students will make a squeeze freeze or ice cream in a bag. The ideal setting for this part of the lesson would be outdoors.
2. 1 tablespoon of sugar and ½ teaspoon of vanilla can be added to the small zip lock bags, and also 1 tablespoon of salt to the large zip lock bags. This can be done prior to the start of the lesson if so desired.
3. Give each student a one of each sized bags.
4. Then add ½ cup of whole milk to the small bag.
5. Remove as much air from the bag as possible and seal the bag. It is important that each bag is sealed properly.
6. Have the students drop the small bag into the large bag with the salt in it. Add 18-20 ice cubes into the large bag. Remove as much air as possible and seal it properly.
7. Students should knead the bags about 10 minutes. When a soft ice cream is formed, remove the small bag from the large bag and give out spoons to eat the ice cream right out of the bag. **NOTE: It is important to use whole milk because other types of milk take too long to freeze. One pint of half and half can be added to a gallon of whole milk. This makes the ice cream richer and it will freeze faster.*
8. Read about the history of ice cream and you could bring and old fashioned ice cream maker to show the students.
9. Students will then make polymers.
10. Warm 1-cup of milk in a pan, do not scorch. Stir in 2 tablespoons of vinegar. Describe what happens.
11. Take the pan off heat and turn the stove off.
12. Take the substance out of the pan and wash it under running water. Shape it into objects such as marbles.
13. Set objects on wax paper on the counter; leave it out for a couple days to dry. Describe what has happened to the substance.

Assessment:

Explain to students how the vinegar and milk react to coagulate casein. Casein is protein molecules in milk, which are so long that they can bend, join to make the casein rubbery. As the material dries, the casein molecules shrink, making it hard.

For more on the history and folklore of ice cream read, “Chocolate, Strawberry, and Vanilla: A History of American Ice Cream” by Anne Funderburg, and “The Great American Ice Cream Book” by Paul Dickson.

GRASS TO MILK

Grades: K-3
Subjects: Science
Montana Standards: Science 3 & 5
Time: 1 hour

Objectives: Students will

- Understand were milk comes from and how a cow processes food to make milk.
- Learn about dairy farms.
- Become aware of the different forms of milk.

Materials Needed:

- Small carton of liquid milk
- Box of nonfat dry milk
- Cups
- Cow color sheet
- Cow diagram sheet
- Props—Mouth-tongs, Rumen-bag filled with confetti, Reticulum-ruler, Abomasum-sponge, Omasum-funnel, Small Intestines-small slinky, Large Intestines-large slinky, Bloodstream-paper heart, Udder-empty milk carton
- Grass to Milk Cards

Keywords:

mouth, rumen, reticulum, omasum, abomasums, small intestine, large intestine, bloodstream, udder, nonfat, dairy, organs, stomach, digestive, ferment, nutrients, organic, acid, enzymes, microbes, cecum, organisms, ruminant, fertilizer, butterfat, automated, technology

Brief Description:

Cows change grass and grains into milk. The dairy cow can do this because she is a ruminant, or an animal with four compartments to its stomach. Thanks to microbes that live in a cow's first two stomachs-the rumen and reticulum- a cow can digest plant materials that many other animals cannot.

The rumen and reticulum are two separate organs connected by a large opening through which food passes constantly. Since the two organs serve a single function they are often referred to as the reticulo-rumen. The microbes in these organs break down plant material through fermentation, releasing nutrients important for milk production.

Only particles under a certain size can then pass through a small opening leading to the third stomach, the omasum. The omasum recycles water and minerals and passes the food to the fourth stomach, the abomasums. The abomasums works much like the human stomach, secreting strong acids and enzymes to break down any undigested food.

As food then passes through the small and large intestines, it is further broken down, nutrients are absorbed and waste consolidated. The small pouch off the large intestine, known as

the cecum, contains microbes that ferment undigested food one last time to extract remaining nutrients.

The nutrients released by theses organisms are carried through the cow's body by the bloodstream. Some are delivered to the udder where they are transformed, drop by drop, into milk.

Unused material is passed from the cow in the form of manure. Rich in minerals and organic material, manure makes an excellent fertilizer for green grass. Not only does the cow provide us with nutritious milk, but it also can fertilize the grass that it eats to produce more milk.

Ruminants do not have any upper front teeth. They eat by wrapping their tongues around their food and pulling it into their mouths.

There are many different breeds of dairy cows and each breed varies in the amount of richness of milk produced. Some dairy farmers keep several breeds of cows in the herd in order to maintain a consistent quality of milk. Holstein-Friesian cows are large black and white cows. They produce the most milk, but the least butterfat. Holsteins are the most popular breed in the United States and adapt to all kinds of climates. Other types of dairy cows are Jersey, Guernsey, Ayrshire, Brown Swiss, and Milking Shorthorn.

The amount of milk a dairy cow produces varies from month to month. All dairy cows that produce milk are female and they cannot produce any milk until they give birth to their first calf. This occurs at approximately two years of age. A good milk-producing cow will give 20,000 to 30,000 pounds of milk per year.

We depend on Montana dairy farmers to give us milk we drink. There are approximately 650 dairy producers in the state and five processing plants, Bozeman, Great Falls, Billings, Kalispell, and Deer Lodge. On today's dairy farms, cows are milking two or three times a day with special automated milking machines. Automated equipment milks the dairy cows and carries the fresh milk to the cooler. The electric milking machine marked the end of the standard milking stool and the tiring job of hand milking by hand. With just two portable automated machines, a farmer can milk a dozen cows in one-fourth the time it use to take by hand.

Through product technology the usability of milk has been improved. In liquid form, milk can be stored in a refrigerator for several days. Milk, in powder or dry form, is made by removing fat and water. It has Vitamins A and D added to it and has a longer shelf life than liquid milk. Nonfat dry milk does not need to be refrigerated when stored in the powder form. Through the use of technology, milk production has been increasing for more than 25 years in the United States.

Lesson:

1. Ask the students for their impressions of the saying "You are what you eat". What happens to the food they eat once it is inside their bodies? Discuss the amazing transformation of food into the basic nutrients our body needs for growth and development. In the case of mammals, the food they eat can also be transformed into milk to feed to their babies.
2. Divide the class into nine groups. Explain that each group will represent a part of the cow involved in the transformation of green grass to the milk we drink. Using the cow diagram and background in information describe the dairy cows digestive system.

Older Students (#3-#6):

3. Pass out a Grass to Milk Card to each of the groups. Ask them to read their card carefully. Point out that the words in italics provide valuable clues to the function(s) of their part.
4. Show the students the nine packets of props (mouth, remen, reticulum, omasum, abomasums, small intestines, large intestines, bloodstream, and udder). Explain that they represent the various roles each of the nine parts plays in the milk-making process. Have groups select the bag of props that best matches the function of their part.

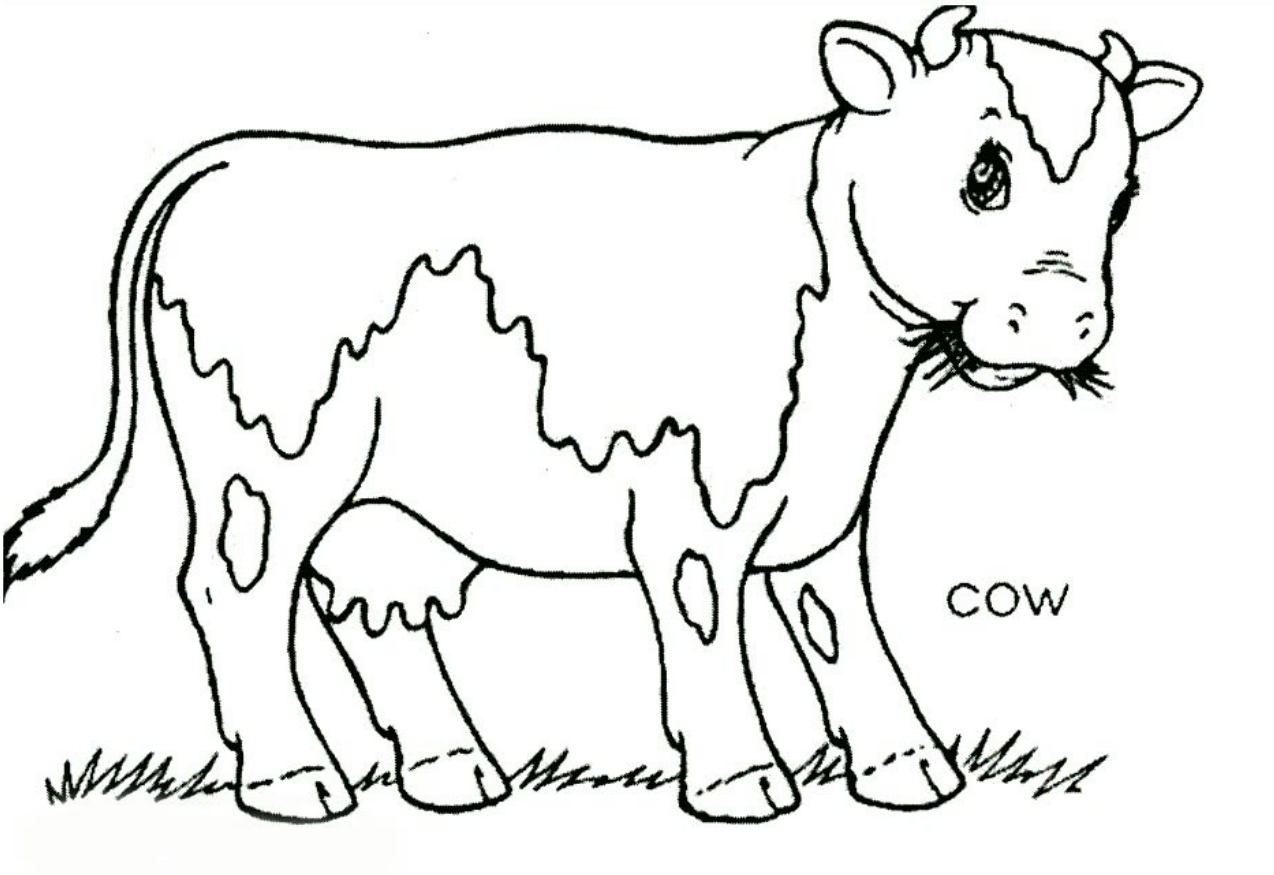
5. Now ask each group to select an answer card listing their identity. Before making their selection, encourage groups to share the information on their Grass to Milk cards with other groups. Point out those important clues may be found on cards held by their friends.
6. Now ask the groups to put their answer cards and props into the sequence of the grass to milk story. Remind the class that two end products are formed, so that at some point the sequence will branch.
7. Review the sequence giving each group a chance to describe and demonstrate their role in the milk-making process using the props.
8. Have the older students label the digestive system on the cow diagram sheet.
9. Begin a discussion of milk by asking where milk comes from, if it is a solid or a liquid, what kinds of containers it comes in, if it always has to be kept cool, etc.?
10. Show a box of nonfat dry milk. Read the pertinent information on the box.
11. Explain that through technology, powered milk was milk that had the water and fat removed, making the shelf life longer than fresh milk.
12. Make some milk from powder. Have the students come the taste of fresh milk and milk made from powder.
13. As a class list ways that powdered milk and fresh milk could be used.
14. List the advantages and disadvantages of liquid milk.
15. List the advantages and disadvantages of powdered milk.
16. Have the students color the cow their favorite breed. You could have students research or look up pictures to see what the different breeds of dairy cows look like.

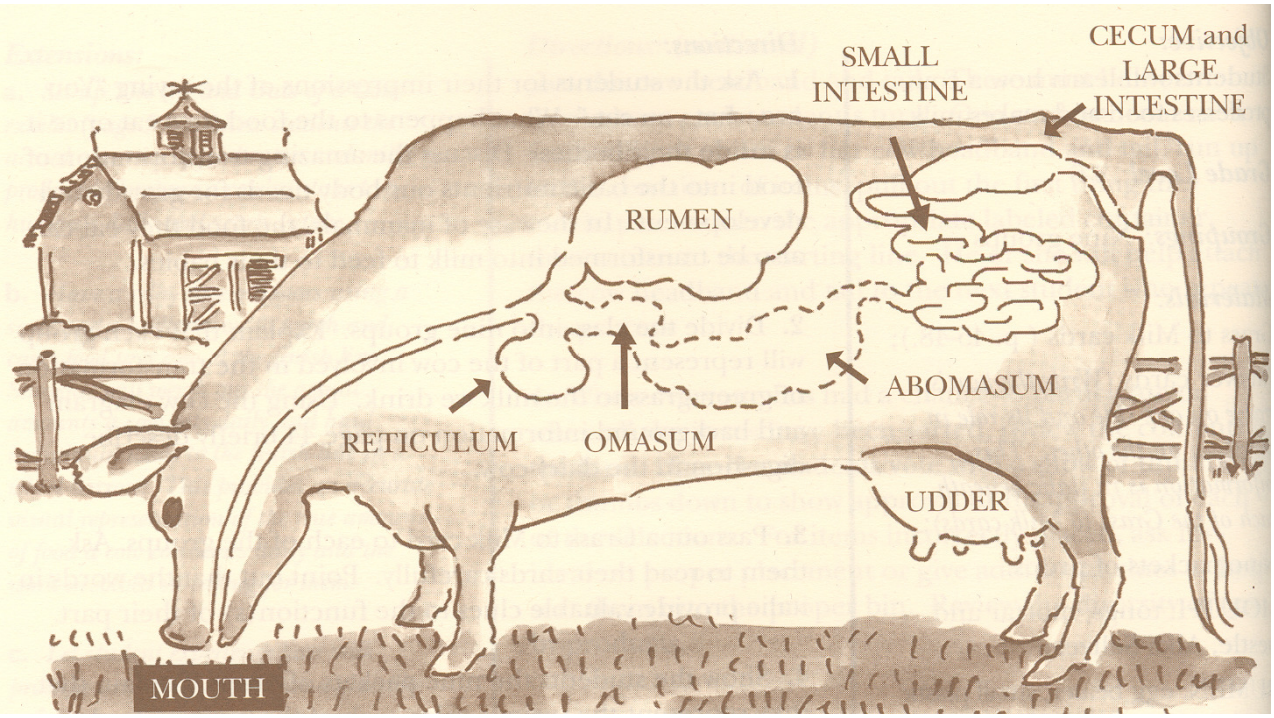
Assessment:

Students should understand how cows make milk. They should also understand that milk comes in a variety of forms and what those forms are. Students should complete the worksheets.

Resources:

Sheldon Farms Seasons: hands-on activities


COW


SMALL
INTESTINE
CECUM and
LARGE
INTESTINE
RUMEN
ABOMASUM
RETICULUM
OMASUM
UDDER
MOUTH

Grass to Milk Card

Cows are notorious for eating on the run. While out grazing in the field they use a strong muscle to grab vegetation and swallow it whole! Then they move on to the next clump. Later the cow burps up a ball of food, called a bolus or cud, which it then chews and chews. Cows can spend up to eight hours a day chewing their cud or ruminating. The food is ground up and mixed with a white foamy froth. This froth acts like an antacid to keep the acidity level in the first stomach, the RUMEN just right for digestion.

What am I?
How do I begin the digestive process?

Answer: *I am the MOUTH. I grab food with my tongue, grind it up with my single set of bottom teeth, and buffer it with my saliva.*

Grass to Milk Card

I am a very large organ and can hold up to 25 gallons of food. Most of the vegetation a cow eats comes to me looking much like it did when it was growing in the field. I work like a large fermentation vat along with my partner in digestion, the RETICULUM. We have a whole colony of microscopic organisms living inside of us that breaks down tough plant fibers without using oxygen! My muscles work to mix, moisten, churn and blend the food with these microbes. Important nutrients are then released and absorbed by the bloodstream. They are a major energy source for the cow and are important in milk production.

What am I?
What is my role in digestion?

Answer: *I am the RUMEN. I blend and churn food, while a bacterium inside me breaks the food down through a process called fermentation. Important nutrients are then released and absorbed by the bloodstream.*

Grass to Milk Card

The true stomach sends digested food and waste my way. More nutrients and water are released and absorbed through my walls into the bloodstream. I expand and contract to move the leftovers along my twisting path to my larger neighbors and relations, the CECUM and LARGE INTESTINE.

What am I?
How do I begin function?

Answer: *I am the SMALL INTESTINE. I absorb remaining nutrients and pass them into the bloodstream. By expanding and contracting I move leftovers along my long twisting path.*

Grass to Milk Card

The SMALL INTESTINE passes its leftovers to me. These are fermented by bacteria in the CECUM and any remaining nutrients and water are absorbed through my walls into the bloodstream. I expand and contract to move the remaining unusable material to the end of the line. It comes out as cow manure, rich in minerals and organic matter. It fertilizes the green grass that can then be turned into more milk.

What am I?
What is my role in digestion?

Answer: *I am the LARGE INTESTINE and CECUM. I expand and contract to keep unusable food moving along. The cecum, a small pouch like extension, with its associated bacteria, ferments the leftovers one last time and any remaining nutrients and water are absorbed. The final product is manure, a rich fertilizer.*

Grass to Milk Card

I take all the nutrients absorbed from the RUMEN, RETICULUM, OMASUM and ABOMASUM and carry these throughout the cow's body. Think of me as a mass transit system, powered by a strong muscular pump that keeps nutrients moving continuously along. In a mother cow, I deliver important nutrients to the UDDER where they are used to make milk for her new calf.

What am I?
What is my main function?

Answer: *I am the BLOODSTREAM. My heart pumps the blood, which is important nutrients throughout the cow's body.*

Grass to Milk Card

When a cow has a calf I kick into action to feed the little tyke. The BLOODSTREAM delivers nutrients through tiny capillaries to each of my four chambers. Within these chambers, milk-making alveoli use the nutrients to form milk, drop by drop. It takes 50-70 hours for a cow to turn green grass into white milk.

What am I?
What do I do?

Answer: *I am the UDDER. I make and store milk until the calf or farmer milks it out.*

BEE BODIES

Grades: 1-3
Subjects: Science
Montana Standards: Science 2 & 3
Approximate Time: 45 minutes

Objectives: Students will

- Understand the physical characteristics of the three different types of honeybees.
- Understand the functions of each type of honeybee.
- Label or cut and paste on the worksheet.

Materials Needed:

- Worksheets
- Glossary of terms

Keywords:

Characteristics, queen, drone, worker, wax, abdomen, thorax, pollen, stinger, proboscises, nectar, colony, glands, sac, mandible, ocellus, antenna, midgut, ventriculus, caste

Brief Description:

There are three types of adult bees that make up a honeybee colony. Each type of honeybee has a slightly different body depending on the tasks they perform. The great majority (about 99 percent) of adult honeybees are sterile female worker bees. The worker bees are the smallest of honey bees. They have long proboscises used to suck up nectar from flowers. Worker bees' hind legs are fringed with stiff hairs that form pollen baskets. Workers have a stinger and a poison gland at the tip of their abdomen. Typically, worker bees can only sting once because their stingers and internal organs are pulled out when they sting and they die. Drones, the male members of the colony, are somewhat larger than the workers. They have rounded abdomens, huge compound eyes, and powerful wings. Drones do not have long proboscises and must be fed by worker bees. They also do not have stingers and therefore cannot defend themselves. Drones do not have wax-secreting glands. The drones only purpose is to mate with the queen. Mating takes place in the air. The queen bee is the largest of the honeybees. She has a long abdomen, a shiny thorax, and does not have pollen baskets on her legs. The queen has a stinger, which she uses to fight off other queens. She may sting multiple times without dying.

Lesson:

1. Work through the first worksheet as a group by labeling the parts of the honeybee. Have younger students cut out the list of words and past them to the correct parts. Discuss where each part goes, referring to the glossary of terms.
2. Once the students understand the parts of a bee, they can work on the second worksheet describing the three types of honeybees.

Assessment:

Discuss and ask the students questions. Why can't drones gather their own food? Why can't drones defend the colony? Why can worker bees usually only sting once? What would happen to a honeybee colony if there were no queen? What would happen to a honeybee colony if there were no drones?

GLOSSARY OF HONEYBEE TERMS

Antenna(e)—the moveable, sensitive feelers on an insect's head which detect odor and movement.

Beebread—a mixture of nectar and pollen. Fed to worker bees and drones in their larval stage.

Bee metamorphosis—the four stages of transformation in the life of a honeybee.

Brood—the offspring produced by the colony (eggs and larvae).

Cell—a hexagonal chamber built of beeswax for brood rearing and storage of honey and pollen.

Cocoon—the silk chamber a larva spins around itself just prior to the pupal stage of development.

Compound Eye—an eye made up of thousands of tiny lenses that allow a honeybee to see ultraviolet light, which is invisible to the human eye, as well as visible light (except red).

Drone cell—a brood cell that is larger than the normal worker brood cells and in which the queen deposits drone eggs.

Egg—laid by a queen bee, this is the first stage in the life of a honeybee.

Exoskeleton—the hard outer covering which forms a bee's body.

Head—the forward body region of the honeybee's three sections that contains the compound eyes, simple eyes, antennae, mandibles, and proboscis.

Honey sac—the stomach-like organ that is connected by a funnel shaped valve to the digestive tract. The nectar stored here will be unloaded into empty hive cells or passed on to house bees for food.

Larva—hatched from the egg the queen bee lays, the larva will pupate and eventurally turn into an adult insect.

Legs—a honeybee has three pairs of segmented legs used not only for walking but also to dust off antennae, brush pollen out of the thousands of branched hairs that cover the body, and to store pollen.

Mandible—located on either side of the honeybee's head, these jaw-like structures are used to chew honey and pollen, and to knead wax.

Midgut or ventriculus—the stomach section in the abdomen which digests food.

Nectar—a sweet liquid secreted by flowers of various plants.

Ocellus—simple eye with a thick lens that can sense changes in the brightness of daylight.

Porboscis or tongue—a straw-like structure used for sucking nectar or honey.

Pollen—the fine, powder-like material produced by the anthers of flowering plants.

Pollen basket—a smooth, somewhat concave surface of the outer hind leg that is fringed with long, curved hairs that hold the pollen in place.

Pupa—the third stage in a bee's life, during which the larva's body changes into that of an adult.

Royal jelly—a milky, yellow syrup that is very high in protein, that young worker bees secrete from glands inside their heads and feed to larvae.

Stinger—found in a chamber at the end of the abdomen (in female honeybees only) and is used to defend against intruders.

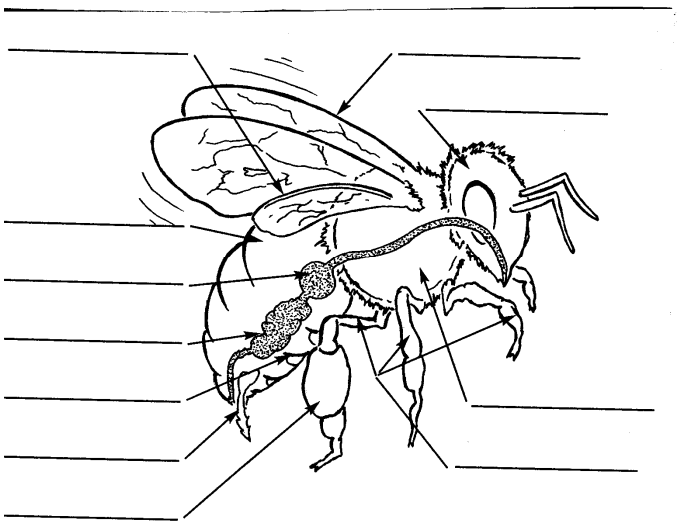
Thorax—the middle section of the honeybee's three sections that contains the flight muscles, the wings and six legs.

Wax gland(s)—four pairs of glands that are specialized parts of the body wall. During the wax forming period in the life or a worker, they become greatly thickened and take on a glandular structure. The wax is discharged as a liquid and hardens to small flakes or scales.

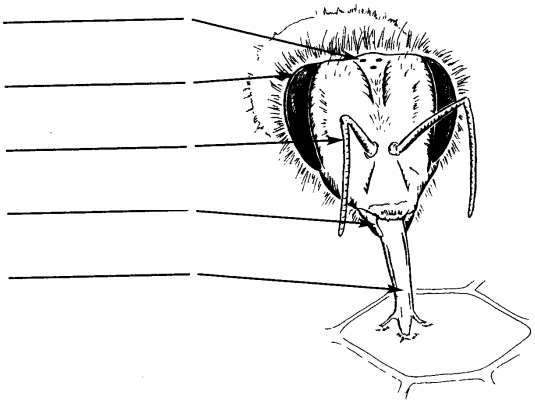
Wings(s)—the honeybee has two sets of flat, think, membranous wings, strengthened by various veins. The fore wings are larger than the hind wings.

The Honeybee Body

Label the honeybee body parts.



Abdomen
Fore wing
Head
Hind wing
Honey sac
Legs
Midgut or ventriculus
Pollen basket
Stinger
Thorax
Wax gland

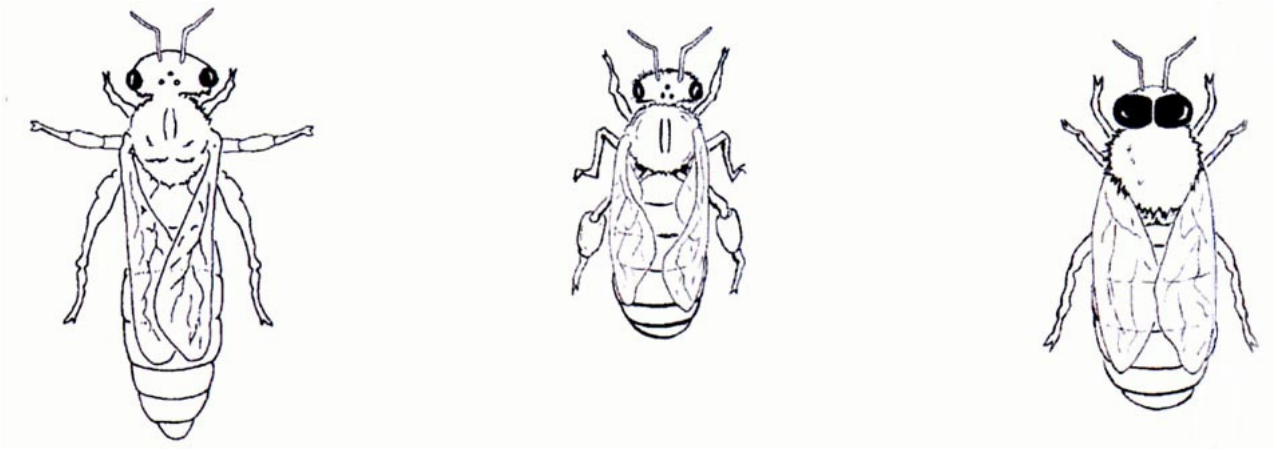


Antenna
Compound Eye
Mandible
Ocellus
Proboscis or tongue

Members of the Hive

Honeybees are social insects and live in groups called colonies. Within each colony there are three types or castes of honeybees: the queen bee, worker bees, and drones. Name three distinct features of each caste of honeybee.

Queen	Worker	Drone
_____	_____	_____
_____	_____	_____
_____	_____	_____



HONEY BEE PHEROMONES

Grades: K-3
Subjects: Science, Math
Montana Standards: Science 3, Math 1
Approximate Time: 2-30 minutes class sessions

Objectives: Students will

- Learn about pheromones and how honeybees use them to communicate.
- Be able to identify different smells.
- Count by 7's.

Materials Needed:

- Camera film canisters
- Peppermint extract, vanilla, banana, vinegar, cinnamon, clove
- Cotton balls
- Honey stick for each student
- Blindfolds
- The Honey Files: A Bee's Life by National Honey Board
- Honeybee Path worksheet

Keywords:

Pheromone, sense, colony, hive, queen, drone, smell, behavior, communicate, scent

Brief Description:

Introduce the students to the idea that honeybees have senses but that they are much different from human senses. For example, bees can see many colors but they cannot see red. Humans on the other hand can't see ultraviolet light, but honeybees can. Humans and bees also perceive odors differently. Humans use their noses to smell, while honeybees use their antennae to detect pheromones, which are chemicals they emit in certain situations.

Lesson:

Day 1

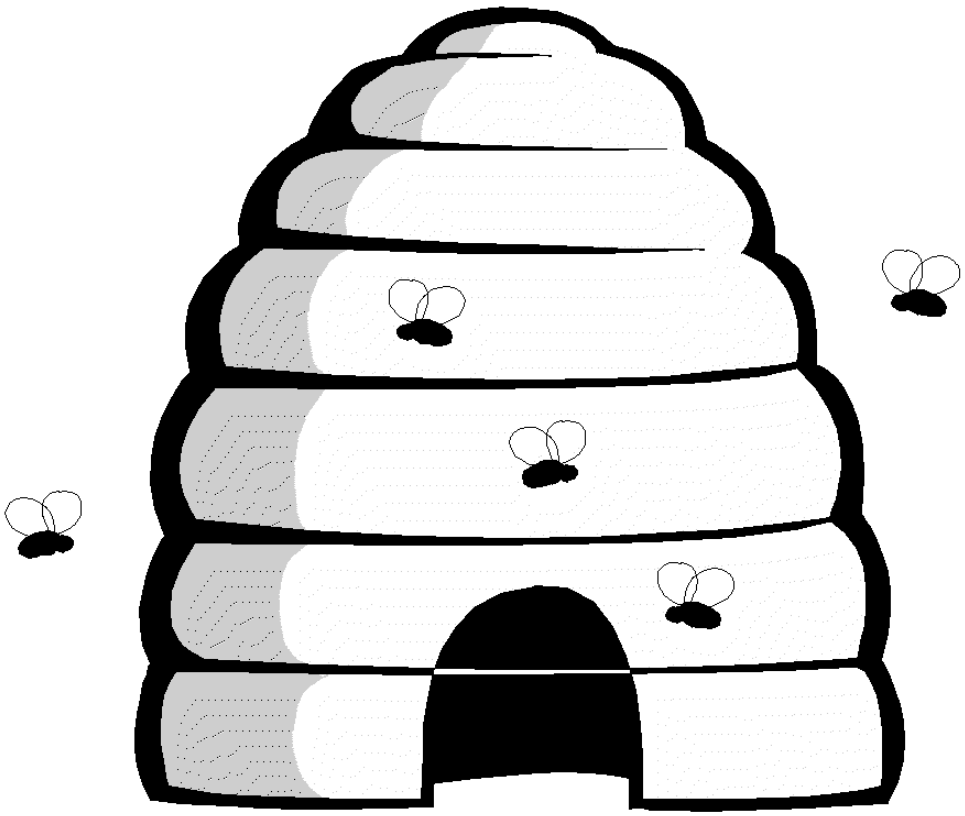
1. You can incorporate the video The Honey Files: A Bee's Life by National Honey Board.
2. Place each scent in a different canister, fill the canisters with cotton balls, and close the lid to keep the odors from escaping.

Day 2

3. Make a maze in the classroom out of tables, desks, and chairs.
4. Hide honey sticks around the room.
5. Give out one scent of each that you have made in the canisters. If you have five scents, pick out five students to have each scent. These are your queen bees.
6. Place the "queen bees" throughout the maze in your classroom.
7. Randomly give out the rest of the scents to the other students, and blindfold them.
8. Have all the students take off the lid to their canisters and smell.
9. Make sure the students can only find what hive they belong to by matching their scent with the queen's scent.
10. After everyone has found their hive, have them take off their blindfolds and look around the room. Make comparisons and have discussion about the end result.
11. Have the students hunt for the honey sticks that have been hidden around the classroom as a treat. **Make sure that you do not have a student with honey allergies!**
12. Students can complete the Honeybee Path worksheet for their math lesson.

Assessment:

Students should have reached their hive by using their sense of smell. Students should understand that each bee hive has a unique smell: the odor a queen uses to attract drones, the alarm pheromone that signal hive members to defend the hive, and the queen pheromone that maintains behavioral control of the colony.



Begin at 7, count by 7's
mark each square until
the bee reaches the hive.

Path to the Beehive

THE BUSY BUZZY BEE

Grades: 1-3
Subjects: Science, Math and Social Studies
Montana Standards: Science 3 & 5, Math 6, Social Studies 1 & 6
Approximate Time: 45 minutes

Objectives: Students will

- Realize the importance of bees to food production and the interdependence of plant and animals.
- Be able to recognize the three different types of bees and their importance.

Materials Needed:

- Arm or head bands
- Colored paper strips
- Bags

Keywords:

Pollination, blossom, queen, drone, worker, colonies, nectar, stamen, pistil, fertilize

Brief Description:

Bees are an integral part of agriculture. Plants are wind pollinated; bird or other insect pollinated, or hand pollinated by man, bees are very important for most of our fruit and nut crops and vegetables. Bees are crucial during periods of blossoming.

Lesson:

1. Ask students to tell you what they know about bees and why bees are important to people.
2. Explain that honeybees are insects that live in colonies. In the colony there are three kinds of honeybees: queen, drone, and worker.
3. Explain the process of pollination.
    a. Why do bees visit flowers? What do they get from a flower? (Nectar and pollen)
    b. What does a bee get on its legs and body hair when it flies into a flower to get its nectar? (Pollen)
    c. Pollen from one another is transferred onto the bee because of its movement.
    d. What happens when a flower or apple blossom is pollinated? (Pollen is transferred from the stamen, the male part of the flower, to the pistil, the female part of the flower; it sets things in motion for fertilization to take place so seeds or fruit can be produced.
    e. What would happen if the blossom or flower didn't get pollinated? (No seeds would be produced.)
4. Each student plays a role of a fruit tree, a buzzy bee, or the producer.
5. Students can wear arm or head bands to separate the bees, producers and trees.
6. Each tree holds 30 strips of colored paper in one hand (one color per flower) and a bag in the other.
7. Each buzzy bee buzzes to a tree, picks a strip of the paper and flies to the next tree. Drops the strip into that trees bag and picks a strip from that tree.
8. One minute represents one growing season. Allow only one minute for the bees to fly from one tree to the next. On the designated signal, the bees return to their hive, leaving their paper strip in the bag of the last tree.
9. The tree producer asks the trees to count the number of paper strips in their bag. The strips will represent the number of fruit they can grow on their tree for the season. After each tree counted its strips, have the trees tell the producer its total.

10. Play the game several times. You can change the conditions. The weather could be cold, windy, or a virus killed many bees, the hive was over crowded bees left the hive.
11. A graph can be made to show the results.

Assessment:

Students should be able to understand how important bees are for pollinating different plants. Students should also be able to tell the difference between the different kinds of honeybees. For more references: The Amazing Bee by William Fox and the video The Honey Files: A Bee's Life by National Honey Board.

WHAT KIND OF HORSE ARE YOU?

Grades: K-3
Subjects: Math, Language Arts, Social Studies
Montana Standards: Math 5, Social Studies 4-6, Literature 1
Approximate Time: 2-30 minutes class sessions

Objectives: Students will

- Learn about horses and their usefulness to farmers before tractors became replaced them.
- Demonstrate an understanding of measurement by measuring classmates with a tape measure and recording their height.
- Know how to read a chart.

Materials Needed:

- Tape measure
- What Kind of Horse are you worksheet
- Horsepower: the Wonder of Draft Horses by Cris Peterson

Keywords:
Measurement, breeds, mare, foal, stallion, gelding, machinery, harness, pony, hands, labor, wither, height, equipment, training, recreation, pleasure

Brief Description:

Horses have been useful animals for thousands of years. Horses are great for working and running. They have strong teeth, sharp ears, keen eyes, and a good sense of smell. A horse has larger eyes than any other land animal except the ostrich and the two eyes can move independently. A horse can look forward with one eye and backward with the other eye. They have wide nostrils to help them breathe easily and also have long, muscular legs that give them strength to pull loads and run at fast speeds.

There are more than 150 breeds and types of horses and ponies. These various breeds are divided into three main groups: light horses, heavy horses, and ponies. Light horses have thin legs, small bones, and weigh less than 1300 pounds. Heavy horses have large bones, thick, sturdy legs, and weigh more than 2000 pounds. Ponies are small horses that stand less than 58 inches high when full grown and weigh less than 800 pounds.

Horses are measured in a unit called *hands*. One hand equals four inches. The horse is measured from the ground to the highest point of the withers. The withers are the ridge between the shoulder bones.

Foals are newborn horses. The foal is either a colt, which is a male less than four years old, or a filly, which is a female less than four years old. Foals are able to stand shortly after they are born and within a few hours they can run about. A mare is a female horse that is more than four years old. A pregnant mare will carry her foal for about 11 months. A stallion is a male horse that can be used for breeding and a gelding is a male horse that is not able to be used for breeding.

In the "good old days" a farmer would have to keep as many as six teams of horses for farm labor. That meant spending an hour each morning just to feed and harness the horses before going to work in the fields or feeding. It took another hour at the end of the day to put the horses away. Since these "machines" came without headlights, a farmer couldn't work after the sun went down, not to mention the fact that the machines would eat as much as one fifth of the crops for energy. You'd think with all that animal labor a farmer would have more than enough help. But during heavy harvest times, as many as 20 extra people might be needed to help do the work on a 440-acre farm.

It would be nice if that was the way things happened. But, like most revolutions, the change from horses to mechanical horsepower was slow to catch on. Tractors were first introduced in the Midwest around the 1900's. But those first machines were cumbersome, inefficient, steam-operated vehicles. It wasn't until the middle 1930's that tractors improved enough to really replace mules and horses as a labor source.

It was this second generation of tractors, along with other machines and farm equipment, which helped pull American agriculture through those grim days of the Depression, into the most efficient and productive industry the country had ever seen. Like other industries in this country, agriculture has benefited from many improvements in technology. It's not accident that today's farmer can farm more land, and produce more food more efficiently, than ever before.

Horses are still important in agriculture; particularly in the western U.S. horses are still used on cattle ranches for roping and branding cattle and for carrying cowboys through rough country to help round up the herds. Horses are also used in non-agricultural settings. In larger cities, horses are used by police to patrol busy areas which are often clogged with traffic. Horses are also used for recreation and pleasure. Some people use horses which are bred and trained for specific purposes, horse racing, polo, cutting, reining, etc.

Lesson:

Day 1

1. Discuss general horse information and the transformation from "horse power" to tractor power.
2. Read the book Horsepower: the Wonder of Draft Horses by Cris Peterson.

Day 2

3. Explain to students how horses are measured.
4. Divide the students into groups of two.
5. Have the students take turns measuring one another in inches. The students should measure each other from the ground to the top of their shoulders, like horses are measured. The students should then take this number and, with the teachers help, divide it by four to find out how tall they are in hands.
6. Have the students locate their height in hands from the chart on the worksheet. The students will then discover what type of horse they are.
7. Once the students figure out what type of horse they are, have them research this horse. The students can find where the horse originates, the classification of their horse (light, heavy, pony), what their horse is known for (racing, pulling, roping, etc.), how much their horse weighs, and what color their horse is. The students should show a picture of their horse, if possible. The teacher should tailor the presentation to each grade level.
8. Have the older student's research farm machinery. Create a timeline of when each machine was invented and how it has improved.

Assessment:

Students should understand the importance of horses in agriculture through the centuries and the units used to measure the height of the horse. Encourage students to read books about horses, My Horses by Heather Miller, Leah's Pony by Elizabeth Friedrich.

BREEDS USED IN THIS LESSON

Shetland Pony

A traditional and popular mount for children in the USA, this hardy little (9.2 to 10.2 hands) dark-colored, thick-coated pony originating in the Shetland Islands of Scotland is a gentle and easy to train worker, capable of pulling twice its weight in driving harness.

Ponies of America—Pony of the Americas (Appaloosa)

These western-type ponies are smaller (14.1 and less) versions of the colorful Appaloosa breed of stock horse. Used mostly under western tack, they are popular for pleasure and show competition. Their color coat is the typical spots and blankets of the Appaloosa.

Hackney Pony

One of the most popular driving breeds in the world, the Hackney Pony (14.1 hands or less) and the Hackney Horse (15.1 hands) are known for their spirit, their refinement and their high stepping action. Both are dark-colored, with high tails and smallish heads also held high.

Quarter Horse

The classic horse of the American cowboy and still used by ranchers today, the short-coupled, heavily muscled and gentle Quarter Horse is a descendant of the Thoroughbred and a popular family horse. Versatile for both pleasure and competition.

Thoroughbred

Long selected only on the basis of soundness, speed and stamina, and one of the first to close its stud book, the Thoroughbred is the world's preeminent race horse. Originated in England around 1700, the breed has both tall distance runners and short-coupled sprinters.

Belgian

A draft breed originating in Belgium of great weight and traction power, usually chestnut and known for a good temperament, strong constitution and being a willing worker. The heaviest recorded horse (3,400 pounds) was a Belgian, who died in Iowa (USA) in 1948.

Name: _____

What Kind of Horse are You?

Use a tape measure to measure a classmate's height.

Inches	Hands	Horse
36-44.8	9-11.2	Shetland Pony
44.8-52.8	11.2-13.2	Pony of the Americas
48-56.8	12-14.2	Hackney Pony
56.8-61.2	14.2-15.3	Quarter Horse
60-68	15-17	Thoroughbred
64-76	16-19	Belgian

1. How tall are you?

   Inches _____ Hands _____

2. What kind of horse are you?

3. How tall was the classmate you measured?

4. What kind of horse is he/she?

A HORSE OF COURSE!

Grades: K-3
Subjects: Science, Social Studies, and Language Arts
Montana Standards: Science 3, Social Studies 3, and Writing 1
Approximate Time: 45 minutes

Objectives: Students will

- Research a specific breed of horse.
- Learn different information about their horse and report it orally or in writing-by-writing their report on the horse outline.
- Complete the horse breeds worksheet.

Materials Needed:

- Osborn's Horses Book
- Internet access
- Horse outline
- Word search worksheet

Keywords:

Eocene, Eohippus, Dawn Horse, ancient, Pliohippus, livestock, research, breeds

Brief Description:

Horses belong to a group called equine or equus. Equine is the scientific name given to the horse. Equus comes from the ancient Greek work meaning "quickness". This group consists of horses, ponies, mules, burros, zebras, and donkeys.

Horses can be traced to the Eocene period somewhere around 50 to 60 million years ago. Eohippus, or Dawn Horse, was about the size of a cocker spaniel-14 inches at the withers and weighed about 12 pounds. He had four toes on his front feet and three on the back. The first truly single-hoofed horse was Pliohippus, which evolved 7 million years ago.

There are more than 350 different breeds of horses and ponies. The average life span for the horse is between 20-25 years. The oldest recorded horse was an English barge horse; his name was "Old Billy", who lived to be 62. Some of the most popular breeds of horses are Quarter Horses, Thoroughbred, Arabian, Appaloosa, Tennessee Walking Horse, and the Morgan. The breed of horse that a person decides to buy depends on how they are going to use the horse. Quarter Horses are preferred by people who work with cattle and have cow sense. Thoroughbreds are prized for their showing, racing, and jumping abilities. Draft horses such as the Belgian, Clydesdale, Shire, and Percheron are used for pulling equipment and heavy loads. These are known as the "heavy" breeds that can weigh up to 1600 pounds and are at least 16 hands high.

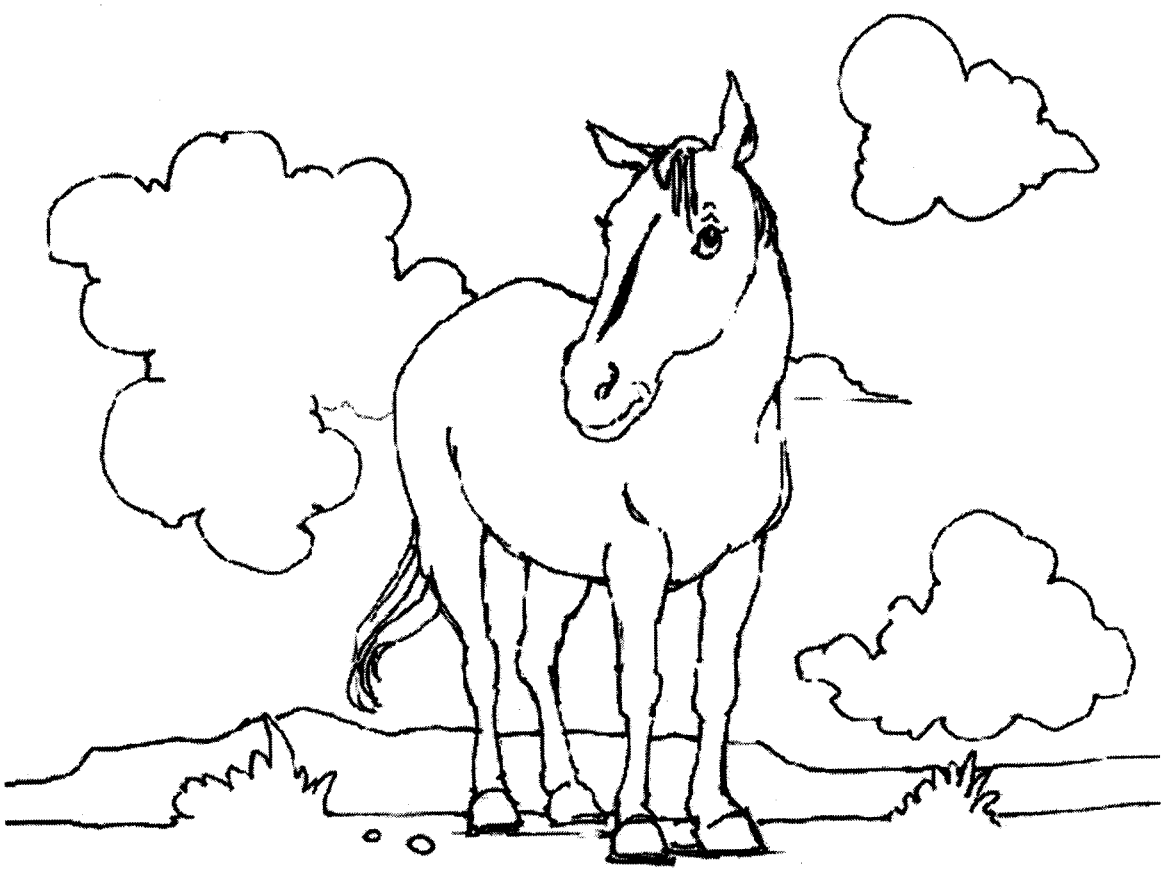
In 1999, Montana had around 130,000 head of horses in the state. You can see a more current statistic count from the website: http://www.nass.usda.gov/mt. Click on Livestock and then click on Other. A lot of ranches still rely on horses to do specific jobs. The Quarter Horse is used extensively on ranches to gather, move, and brand cattle.

Lesson:

1. Have the students research about a specific horse breed, using library resources and the Internet. Have them orally present the information they found on their horse. For the older students use the horse outline to write a short report of their horse.
2. Have the students complete the word search worksheet.

Assessment:

http://www.ansi.okstate.edu/breeds/horses/ Information about horse breeds.
http://www.horseworlddata.com/breed.html Description of the different horse breeds and organizations.



HORSE BREEDS

E H R N A G R O M C
V A E R I H S P L M
A C T R X Y I Y B L
O K R B M N D D E N
D N A L T E H S L A
H E U O S R C T G I
O Y Q D P O H N I B
R W A L K E R I A A
S L I P I Z Z A N R
E A S O O L A P P A

APPOLOOSA
ARABIAN
BELGIAN
CLYDESDALE
HACKNEY
HORSE
LIPIZZAN
MORGAN
PAINT
PINTO
QUARTER
SHETLAND
SHIRE
WALKER

THE FEED BAG

Grades: K-3
Subjects: Science and Health
Montana Standards: Science 3, Health 1 & 7
Approximate Time: 45 minutes

Objectives: Students will

- Understand the importance of the nutrition that horses need.
- Make treats for a horse.
- Make treats for themselves.

Materials Needed:

- Flour
- Oatmeal
- Eggs
- Brown sugar
- Applesauce
- Vegetable oil
- Molasses
- Hot water Zip-lock bags
- Blueberry jellybeans
- Candy corn
- Granola
- Shredded Wheat
- M&M's
- Cheerios
- Horse shaped cookie cutter

Keywords:
Mustang, nutrition, forage, hay, acres, protein, carbohydrate, recipe, graze, ingredients, vitamins, minerals, cecum

Brief Description:

Discuss with students the importance of nutrition and that it is the same with animals. Domestic horses require much more care than other livestock. Wild horses, or mustangs, are able to survive without human care. However, as man has tamed the horse, he must also take care of it. Horses eat grass, hay, grain, and pellets. Horses that are kept inside all the time eat mostly hay and grain. Horses kept outside eat grass during the spring, summer and fall, and are fed hay in the winter. They also require a lot of water. On an average day of 70 degrees, an adult horse will drink 11 gallons of water.

Horses are not able to digest food very well, so they must have high quality feed. Horses have a cecum which is attached to the small intestine where the food must go through to be processed. Although they are able to eat roughage like cattle and sheep, they do not have four stomachs to efficiently digest it. This is why horses eat all the time. They must eat only small amounts throughout the day in order to get the nutritional value from their feed.

If you would allow a horse to graze unrestricted and eat every bit of edible grass, your land could become a weed patch with miniature dust storms in the summer and muddy bogs in the winter. By being aware of grass facts and horse sense, you can prevent this problem. Here are some of the facts: One horse needs about 825 air dry pounds of hay or forage per month, or about 5 tons of hay per year. A horse needs supplemental feeding on grazing land to correct deficiencies

in protein or other essential nutrients in native forage. A horse needs grain in his diet when he is worked regularly. Horses graze plants completely to the ground leaving little opportunity for regrowth. Horses are very mobile. They seldom lie down unless they are very young or very old. Consequently, in moving about they usually "tramp out" as must or more forage than they eat, particularly when confined in a small enclosure. The smaller the acreage, the greater the destruction of the vegetation if horses are allowed to graze continually, even when ample hay is supplied. Horses confined to small acreages are more susceptible to parasites, diseases and boredom. They should be examined by a veterinarian at least once a year.

Lesson:

1. Have students make homemade cookies. Follow the Horse Cookie Recipe.

   Ingredients:

4 cups flour	1 egg
3 cups oatmeal	4 tablespoons brown sugar
¾ cup applesauce	4 tablespoons vegetable oil
1 cup hot water	½ cup molasses

   Directions: Preheat oven to 300 degrees, and grease a baking sheet. Mix oatmeal, flour and brown sugar together. Then mix in egg, vegetable oil, applesauce and molasses. Add hot water and mix well. Roll out dough to ½ inch thickness on a floured surface. Cut out shapes using cookie cutters (horse shape). Place cookies on baking sheet and bake for one hour. Take out and let cool.

2. Have the students then make their own feed sack. Horses eat and drink water, corn, oats, hay, sugar beet pulp, and bran. These foods provide the horse with their nutritional needs. (Water, corn-protein/carbohydrates, oats-protein/vitamin B, hay-protein/minerals, vitamins, sugar beet pulp-carbohydrates, bran-protein/carbohydrates.) Take a zip-lock bag and add water-blueberry jellybeans, corn-candy corn, oats-granola, hay-shredded wheat, sugar beet pulp-M&M's, and bran-Cheerios.

Assessment:

Students should understand the basic nutrition of a horse and connect with the nutrition of humans.

BEE LEAF IN THE LEAFCUTTER BEE

Grades: K-3
Subjects: Science & Math
Montana Standards: Science 1 & 2, Math 1-2, & 5
Approximate Time: 1 week

Objectives: Students will

- Become aware of leaf cutter bees and their role in optimizing alfalfa seed production.
- Become aware of the life cycle of the leafcutter bee.
- Understand the design of a brood cell.

Materials Needed:

- Gallon jar
- One cup measurers
- Small navy beans-several bags
- Shoe box (representing the nesting blocks)
- Toilet paper rolls cut in half horizontally-1/2 for each student-teacher tape one end closed
- Green tissue paper to be torn in small pieces(represents leaves cut by the bees)
- Yellow cotton balls (representing the pollen
- Blue Play dough(representing nectar)
- Rice (representing the egg)
- Green circle of paper the size of the paper tube
- Slide show from www.insectclopedia.com downloaded to a CD or disk by the teacher

Keywords:

Leafcutter bees, nesting block, pollen, nectar, egg, capping, cell, incubation, dehumidification, alfalfa seed, pollination, larva, mature, hatch

Brief Description:

Alfalfa is a major crop in Montana, which ranked eighth in the U.S. in alfalfa hay production and third in acreage in 1997. In 1997, Montana also had 12,000 acres intensively managed for alfalfa seed production. Efficient commercial seed production often depends upon successful management of alfalfa leafcutting bees. Alfalfa leafcutting bees are the major commercial pollinator of seed alfalfa in western North America, although they were introduced to the United States (accidentally) just over 60 years ago. Some estimates indicate that each female bee can pollinate enough flowers to produce a quarter pound of seed. The alfalfa leafcutter bee, about half the size of the honey bee, is black with white-yellowish bands on the abdomen. Female alfalfa leafcutting bees are termed “solitary bees” because each builds her own nest, consisting of a sequence of brood cells in a straight line within an existing cavity. For each larva, the adult female builds a capsule-shaped cell constructed of semicircular or circular leaf pieces cut from alfalfa or

other plants. In nature, the cavity used for nesting may be something like a tunnel created by a beetle emerging from a log. Fortunately, females will readily accept artificial nest boards and so can be induced to nest in high densities at the edge of alfalfa fields. For example, for a five acre field, one shelter, containing 28 nesting blocks, is positioned on the edge of the field. The home range of a leafcutter bee is approximately ¼ mile from there nesting block. The alfalfa should be in the early stages of bloom when the bees are released.

After the nesting blocks have been provided, female leafcutter bees collect fragments of leaves to construct individual nest cells. The bees cut leaves in a very distinctive manner, making a smooth semicircular or circular cut from the edge of leaves about the size of a pencil in diameter. However, leafcutter bees do not eat the cut pieces of leaves that they remove. Instead, these are carried back to the nest and used to fashion nest cells within the previously constructed tunnels. Each leaf-lined cell is then provisioned with a mixture of nectar and pollen. An egg is then laid and the cell sealed, producing a finished nest cell that somewhat resembles a cigar butt. A series of closely packed cells are produced in sequence so that a finished nest tunnel may contain numerous cells. The young bees develop and remain within the cells, emerging the next season.

In the late summer, on irrigated acreage; the water is discontinued, forcing the alfalfa seed to mature. At this time the nesting blocks are removed from the field. These blocks are taken to a storage area for dehumidification before extraction from the nesting blocks. After extraction the individual cells are dehumidified more to prevent spoiling. They are then stored at 30-50 degrees F. for the winter to prevent premature hatching. Sixteen to twenty days prior to field placement, the cells are placed in hatching trays and the temperature is adjusted to 86-90 degrees F. After this incubation period the mature bees are released in the blooming alfalfa fields to begin their work of pollinating the crop. As the crops are pollinated the cutter bees begin nesting again. This life cycle occurs annually.

Managing bees constitutes a major portion of the cost to alfalfa seed growers, because nesting bees must be provided with shelters containing suitable nesting material, consisting of wood, paper, or polystyrene boards containing thousands of nest holes (7/32 to1/4" in diameter and 2 5/8" deep). Nest boards, as well as bees, can be purchased from a number of commercial sources in the United States and Canada.

For example, for a five acre field, one shelter, containing 28 nesting blocks, is positioned on the edge of the field. The alfalfa should be in the early stages of bloom when the bees are released. By fall the bees work is finished, the alfalfa seeds are mature and ready to be harvested. The alfalfa seed is the primary income for the farmer. Often times the farmer is able to earn a second, smaller income with the producing of the leafcutter bees. The leafcutter bee market at present time (2004) is much lower than it was about twenty years ago. These bees are sold in gallon containers; that container holds about 10,000 bees.

Lessons:

1. The teacher will need to download the slide show from the web site listed above. This slide show shows the entire life cycle of the leafcutter bee in great detail. It would be best to download and save to a disk or CD for a better presentation. The teacher will need to preview this slide show to prepare a discussion for the class presentation. There are slides on honey bees as well on this show. Depending on your unit, you may choose to compare and contrast the two types of bees. The teacher should be prepared for an appropriate grade level discussion.
2. The students will role play the duties of the leafcutter bees. The teacher will provide the nesting block made from the shoe box filled with half-length toilet paper rolls. There will need to be more than enough rolls for each student to have one. Explain that the bees choose and remember which cell is theirs and work to fill it. As the bee works to fill its

cell it is doing its primary job of pollinating the flowers of the alfalfa plant. While collecting pollen and nectar from the flowers, the actual pollination takes place, thus allowing the plant to produce alfalfa seeds. The teacher will have taped the inside end of the tubes shut. The "bees" will tear little pieces of green tissue paper from the "field" (representing the bites of leaves) and stuff them into the bottom of their cell (enough to cover the bottom). Then the bees will make many trips out into the field to collect little bits of yellow cotton ball (representing the pollen) and put a layer of "pollen" over the "leaves". Then the bee will collect "nectar" (represented by blue play dough). Next the egg is laid on the nectar. Finally the bee caps this cell with more small pieces of green paper. At this point the teacher will put a round disk, the diameter of the tube, inside the tube before the child builds their second cell. In real life the cutter bee just starts another cell. The teacher will then explain the rest of the life cycle process (refer to background information).

Extended Lesson:

3. The farmer needs to raise or purchase leafcutter bees according to his (alfalfa) acreage. He needs approximately 3 gallons of bees per acre. There are about 10,000 larva cells in a gallon, each being a little less than ½" in size.
4. The teacher will provide a gallon jar, numerous one cup measurers, and a lot of beans. Point one that since ten-thousand would be too hard to count, groups of children will count out tens- then 100's into the one cup measurers. The number in a one cup measurer needs to be recorded and figure sixteen cups in a gallon. Spread the beans out and tell the children that three times this many bees would work on one acre of alfalfa collecting pollen and nectar. An acre is about the size of a football field.

Assessment:

Through discussion, the children will be able to tell the primary purpose of the leafcutter bee and discuss the life cycle of this bee.

PIG FARMING

Grades: K-3
Subjects: Art, Language Arts, Math, Science, and Social Studies
Montana Standards: Art1, Literature1&5, Reading1&4, Speaking1, Writing1&2, Math1&2, Science1&3, Social Studies1, Language1&3
Approximate Time: Three 30-45 minutes

Objectives: Students will

- Learn about pig farming.
- Find out about the pig family.
- Discover there are many different breeds of swine.

Materials Needed:

- Stories
- Video
- Plastic pig
- Scissors
- Glue
- String
- Pipe cleaners
- Hole punch
- Poster paper
- Cardboard tubes
- Paper bags

Keywords:

Pork, breeds, hogs, pigs, swine, sow, boars, farrow, litter, herd, weaning, piglets, sty, pigpen, omnivorous

Brief Description:

On many Montana farms, pigs are kept in sheds to protect them from the cold. Some pig farms keep the pigs indoors throughout their lives and the growing conditions are carefully controlled. Pigs are excellent mothers and give birth to a litter twice a year. Each litter averages seven to eight piglets but as many as 10 to 12 are common. There are eight main types of pig breeds: Berkshire, Duroc, Yorkshire, Poland China, Hampshire, Chester White, Spot, and Landrace.

Lesson:

1. Introduce "Jasper", AMS plastic pig. Discuss the difference between a pig and a hog. Ask, "How would you take care of a pig?" Discuss what pigs might eat and what they need to stay healthy. Record responses on a pigpen-shaped poster. Watch the video, "Montana Country: Cattle, Sheep, and Pigs" and read Life On A Pig Farm by Judy Wolfman. Review and compare the care of pigs. Ask, "How is a pig similar us?" Introduce the word "omnivorous". Teach the students the finger play, "This Is The Farm". Students read, discuss, do the activities, and color Learning About Pork, pages 1-6.
2. Read the story Pigs to review the eating habits of pigs and the production of a new litter of piglets. Teach students "The Farmer in the Field" singing game. Then sing, "Five Little Pigs", and do the finger play, "Eight Pigs". Review pig vocabulary. Students will make a "Pig and Piglets Mobile" or make a "Pig's Home".
3. Display "Jasper" and show pictures of the different American breeds of swine (pictures in 4-H Swine Production booklet and The Pork Industry Progress pamphlet- AMS). What breed of swine is "Jasper"? Students will do "Pig Breeds" page 8 of Fun With Pork.

Extended Activities:

1. Read My Pigs by Heather Miller. Each student craft a paper tube pig or paper bag pig and write a story about their pig.
2. Share the story Small Pig by Anita Lobel. Play "Pigs in the Mud": Cut a mud puddle shape from brown construction paper. Give each child eight Mini Pigs and a piece of paper on which to write math facts. Tell the a child to toss the pigs and then write on his/her paper "_____ pigs in the mud + _____ pigs on dry land = 8." Change the number of pigs as needed to reinforce the number facts being taught.
3. Play the game, "Swapping Farms".
4. Take a field trip to a local pig farm or invite a swine producer to the classroom to show a piglet and tell how to raise pigs.

Assessment:

1. Students make a Pig "Graduated Pages" Book to show how to care for pigs.
2. Students play the "Pig Vocabulary Mix and Match" game to review their knowledge about pig farming.
3. Play the "Pig word game", (Fun With Pork, page 14).
4. Play the dot game, "Pigpen", to review the facts about pigs. Draw 25 dots on a wallboard. Divide the class into two teams, Team 1 and Team 2. Taking turns, ask a team member a question. If he answers correctly, he connects any two dots on the grid. If he answers incorrectly, the question goes to the opposing team. The object of the game is to complete a box, or pigpen. Each time a team completes a pigpen, write the team's number inside it. The team with the most pigpens at the end of the game wins.

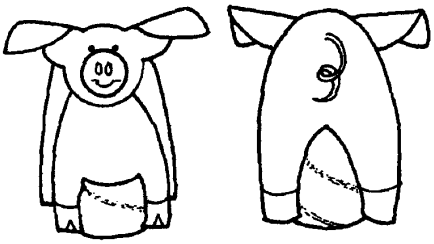
Teaching Resources:

1. "Pig and Piglets Mobile", T- 183/T-184, AMS Treasure Chest K-3 Resource.
2. "Glossary – Farm Animals", T-63, AMS Treasure Chest K-3 Resource.
3. Paper Bag Pig, T-49/T-52, AMS Treasure Chest K-3 Resource.
4. Pigs color page, S-42, AMS Treasure Chest K-3 Resource.
5. Learning About Pork, National Pork Producers Council, AMS Treasure Chest.
6. Mini Pigs – Crystal Springs Books, www.crystalsprings.com, or 1-800-321-0401, package of eight - product # 8163 - AR
7. Fun With Pork – activity book, WPPA, AMS Treasure Chest K-3 Resource:
    - Dot to dot pig - page 5
    - Pig breeds - page 8
    - Color Page Pig - page 19
8. "Jasper", plastic pig – Breyer Animal Creations, AMS Treasure Chest
9. 4-H Swine Production, MSU Extension Service, Bulletin 1198
10. "Montana Country: Cattle, Sheep, and Pigs", 12 minute video, AMS Treasure Chest.
11. Pigs by Gunilla Ingves
12. My Pigs, Heather Miller, AMS Teacher Resource Library.
13. Life On A Pig Farm, Judy Wolfman, AMS Teacher Resource Library.
14. Small Pig by Anita Lobel.
15. Baby Pig by P. Mignon Hinds
16. "Country Kids Magazine", pull-out section on pigs, December 1982
17. How to Make Books With Children Vol. 2,"Graduated Pages" book, page 93-94, Evan-Moor, 1991.
18. Color, Cut, and Paste Animal Homes, Pre K-1, "Pig's Home", page 22, Evan-Moor.
19. The Paper Tube Zoo, Grades1-6,"Pig", page 5, Evan-Moor

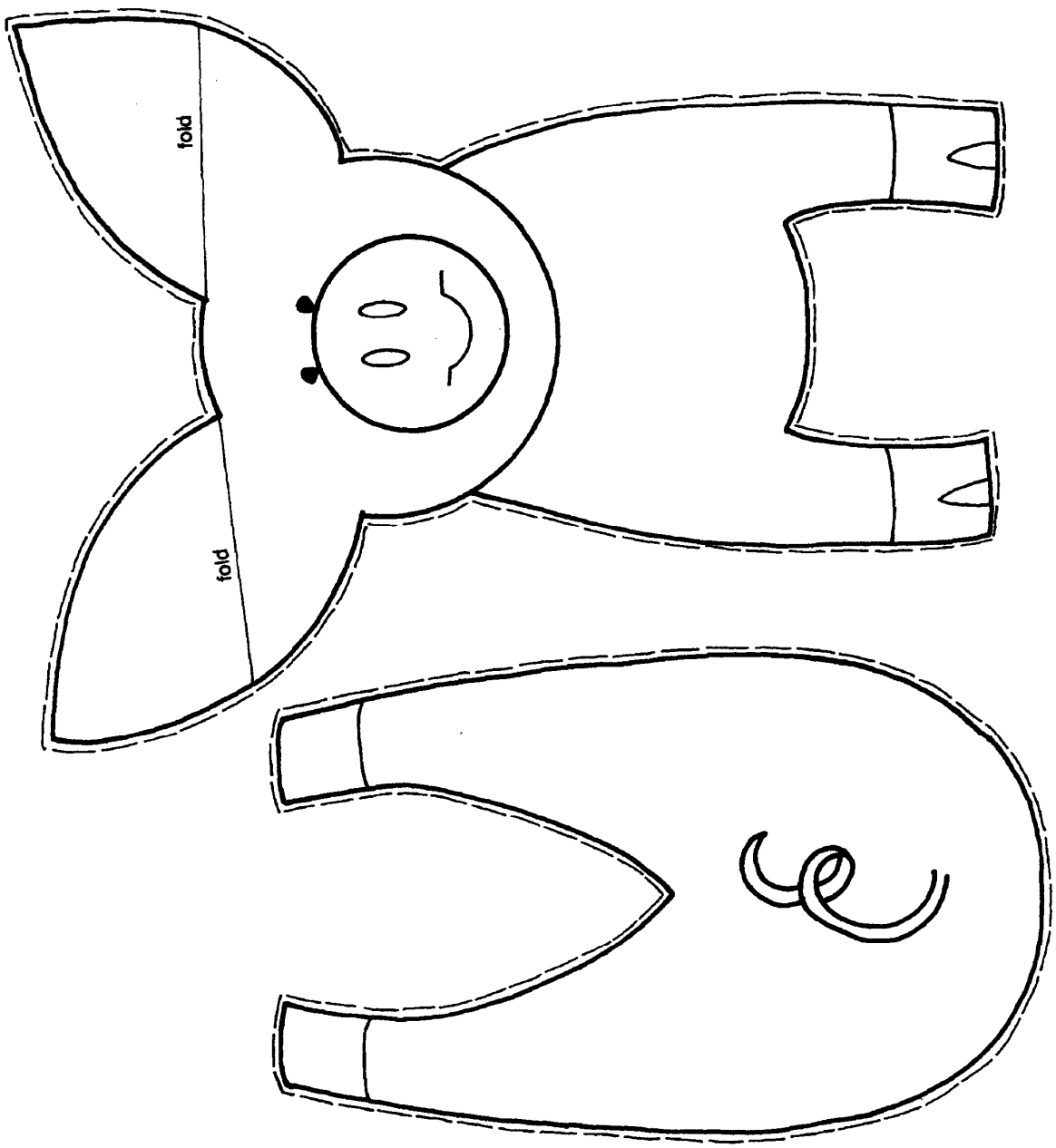
20. Field trip to a local pig farm.
21. “Pig Vocabulary Mix and Match” game, AMS Treasure Chest.
22. Animal Agriculture Myths and Facts, Midland Pork Producers, AMS Treasure Chest.
23. People On The Farm: Corn and Hog Farming, U.S. Department of Agriculture Office of Governmental and Public Affairs, AMS Treasure Chest.
24. “Pork Industry Progress” pamphlet, American’s Cut, “Swine Family Tree”, AMS Treasure Chest.
25. Songs and games from AMS Treasure Chest K-3 Resource:
    - The Farmer in the Field T-19
    - Farm Animals T-21
    - Five Little Pigs T-24
    - On The Farm T-34
    - Eight Pigs T-36
    - Swapping Farms T-47

Pig

1. Color the pig.
2. Cut out the pig body pieces and paste them on the tube.

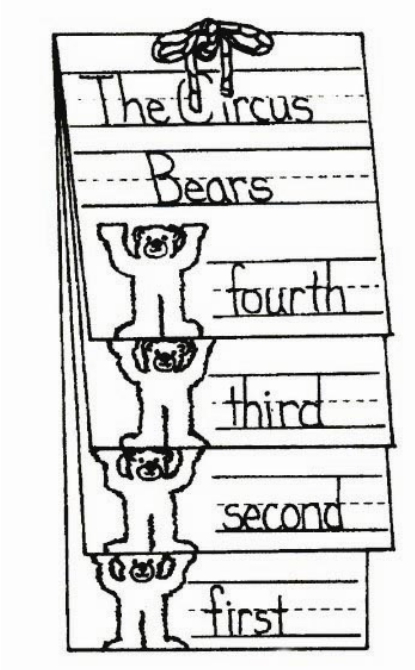


front back



”Graduated Pages” Book

A handy and easy-to-make individual mini-book
Use this book again and again.



Writing Suggestions

Cut writing paper to fit on each layer.

Use the pig pattern to retell the rhyme *This Little Piggie Went to Market.*

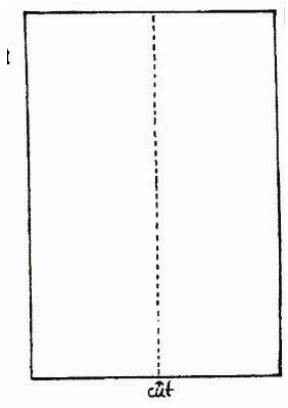
Paste ice cream cones on each level to practice counting by 2, 5, and 10.

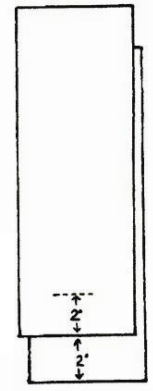
Review ordinals by counting the first, second, third, and fourth bear.

Paste a good book sticker on each level and record what you’ve read.

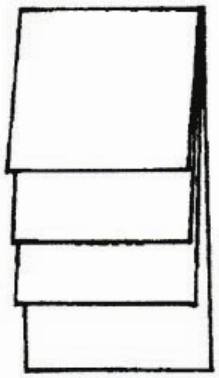
Steps

1. **Begin with a sheet of 12” x 18” (30.5 x 45.7 cm) construction paper.**

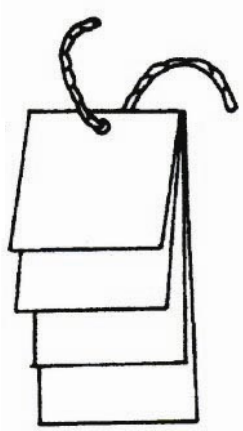


2. 

Lay the 2 pieces together with the bottom one 2” below the top. Mark 2” up on the next layer.

3. 

Fold the top over to the 2” mark. Press a fold at the top.

4. 

Punch a hole and secure with a yarn bow.

PIG OUT ON PORK FACTS

Grades: K-3
Subjects: Language Arts, Art, Science, and Social Studies
Montana Standards: Art1, Literature1&3, Media2, Reading1&2, Speaking2, Writing1-3, Library1&3, Science 1&3, Social Studies1; Language1&3
Approximate Time: Four 45-60 minutes

Objectives: Students will

- Learn the parts of a pig.
- Discover unusual facts about the pig.
- Have a "Pig Out Day".

Materials Needed:

- Poster paper
- Sticky tabs
- Small bucket
- Tape recorder
- Reference books
- Pink cupcake papers
- Rubber bands
- Toilet paper cardboard rolls
- String
- Hole punch
- Black markers
- U.S. map
- Video
- Pig stories
- Paper plates
- Sandwich ingredients
- Pink lemonade
- Plastic knives

Keywords:

Snout, jowl, front leg, knee, pastern, forearm, forerib, fore flank, belly, rear flank, hoof, dew claw, rear leg, hock, stifle, ham, tail, rump, loin, back, shoulder, neck, ear, eye, face, bristles

Brief Description:

Pigs are mammals with bristly hair that thinly covers their bodies. It is commonly said that they are stupid and dirty. Not True! Pigs have a high animal I.Q. and are smarter than horses, cows, or elephants. Pigs are unlike other livestock in that they don't have to be rounded up like cows or sheep. Pigs will come running, but only to a particular call. They are really clean animals. Pigs cannot sweat when it is hot, so wallowing in wet mud or cool water helps them lower their body temperature. Pigs can become pets and the favorite is the Pot Belly Pig.

Lesson:

1. Give a pig call…SOO-ooeyy! Explain how the call gets the attention of pigs, but that one call does not work for every pig. Each group of pigs will recognize their producer's call. Teach the students three or four calls. Tape-record the students practicing their pig calls. Display a large "Pig Parts" diagram poster (page 17, Fun With Pork) without the labels. Make sticky tab labels for the pig's parts and place all folded tabs in a bucket. Play a "Pig Parts" game to learn the parts of a pig. At each turn, while a player draws a tab from the "slop" bucket and tries to find that part of the pig on the chart, the other players will give

pig calls until the tab is placed on the chart. When the "slop" (tabs) is gone, discuss and review the parts of the pig.

2. The pig's snout is used to root or dig for vegetable roots, one of their favorite foods. Each student craft a "pig snout" with half of a toilet paper cardboard roll, one pink cupcake paper, and string. Put the cupcake paper over one end of the paper roll and wrap the rubber band in place to hold the cupcake paper. Punch holes on each side of paper roll to attach string. Then using a marker, draw nostrils on the pink cupcake paper. Teach the finger play, "Pigs" and students can wear their "pig snouts" while acting out the finger play.
3. Using "The Pig Book" idea (T-66 AMS), make an "All About Pigs" book with paragraphs of true and unusual facts about pigs. Ask students to wear their "snouts" to *root out* interesting pig facts from reference books and "Wallowing in the Facts" or "Short Snoots".
4. Celebrate pigs by having a "Pig Out Day". Wear pink, drink pink lemonade, and make "Funny Face Pig Sandwiches". Sing pig songs (list in "Pig Farming" lesson plan), read pig stories, and write pig poetry. Have fun creating piggy puns. Students can use a dictionary to hunt for pun opportunities using the word "pig" or "hog". ("pignic", "Pig Dipper", "hog-wild", "pig-me-up") Have students illustrate their new words and make a class "Pigtionary".

Extended Activities:

1. In groups of 4 (3 pigs, 1 wolf), have children make paper plate pig or wolf puppets and tie string to make necklaces. Read <u>The Three Little Pigs</u> by Peter Seymour. (Or version of choice.) Follow up by reading a twist to the original story: <u>The Three Little Pigs and the Fox</u> by William Hooks or <u>The True Story of the Three Little Pigs</u> by Jon Scieszka. As a story is being read, have the students act out the movements with their pig and wolf puppets. Compare story plots.
2. Play the game, "Animal Chase".
3. Complete the "Pork Producing States" activity. Update the map by researching the leading pork producing states and label with a pig drawing.
4. Watch the video, "Dairy Farms, Pig, Poultry Trivia".
5. Have fun reading pig tongue twisters. Students write pig tongue twisters, trade with someone and practice reading each other's tongue twisters.
6. Read pig jokes and then write a pig joke. Share jokes as a group sitting in a circle-pigpen.

Assessment:

1. Reproduce the "Pig Parts" diagram without the labels. To check knowledge, have students label using a list of pig parts words.
2. For journal writing, tell why a pig would make a good pet.

Teaching Resources:

1. "The Pig Book", T-66, AMS Treasure Chest K-3 Resource.
2. "Swine"-facts and activities, S-43/S-44, AMS Treasure Chest K-3 Resource.
3. <u>Pork Education Handbook</u>, National Livestock and Meat Board, AMS Teachers Resource Library.
4. "Pigs" – finger play, T-37, AMS Treasure Chest K-3 Resource.
5. "Animal Sounds" – song, T-23, AMS Treasure Chest K-3 Resource.
6. "Animal Chase" – game, T-48, AMS Treasure Chest K-3 Resource.
7. Contact 3-2-1 "Dairy Farms, Pig, Poultry Trivia", 28-minute video, AMS Teacher's Resource Library.

8. "Agriculture Connections", Rebecca Baker, AG in the Classroom, p. 3 - Lasting Lessons – Positively Pigs: "Wallowing in the Facts", AMS Treasure Chest.
9. Animal Agriculture Myths and Facts, AMS Treasure Chest.
10. Charlotte's Web by E.B. White
11. The Three Little Pigs by Glen Rounds (or version of choice)
12. "Munch Montana Focus On Pork", AMS Day Mailing, March 1995
13. "Short Snoots" – activity poster, Midland Pork Producers, AMS Treasure Chest or AMS AG Day Mailing March 1995:
    - Puzzle (pig) Picture
    - Tongue Twisters
    - Did You Know?
    - Pig Jokes
    - Draw A Pig
    - Recipe: Funny Face Pig Sandwich
14. Fun With Pork, an activity book, WPPA, AMS Treasure Chest:
    - Hidden Picture - corn page 3
    - Pork Producing States page 11
    - Pig Word Game page 14
    - Pig Parts page 16-17
    - Word Hunt page 7
    - Pork Industry Terms page 9
    - Pig Glossary page 20

THIS LITTLE PIGGY WENT TO MARKET...

Grades: K-3
Subjects: Art, Language Arts, Health, Math, Science, Media, and Social Studies
Montana Standards: Art1, Media1&3, Library1&3, Reading1&4, Speaking1&2, Writing1&4, Health1&5, Math2&5, Science1, Language1&3, Social Studies 1&5

Objectives: Students will

- Discover the difference between feeder pigs and market hogs.
- Explore pig products and by-products.
- Learn the importance of pork in our daily lives.

Materials Needed:

- Story
- Song
- Poster paper
- Worksheets
- Food ads
- Reference books
- Pork snacks
- Live pig

Keywords:

Feeder pigs, market hogs, lean pork, butcher, loin, sausage, pork chops, lard, ground pork, bacon, spare ribs, ham, pork steak, pork roast, pigs feet, pigs knuckles, chitterlings, meat inspector, by-products

Brief Description:

American farmers raise 100 million pigs each year. A six-month-old pig weighing 220 pounds is ready for market. One market hog could furnish a family with about 20 pounds of bacon, 30 pounds of ham, 30 pounds of pork chops, and 80 pounds of other meat. Nearly every part of the pig is used for pork products or by-products. Approximately one-half the value of a pig comes from the ham and loin. Pork is the world's most widely eaten meat.

Lesson:

1. Sing "To Market, To Market" and color a picture of a fat pig. Play "This Little Pig" and compare the different pigs by asking "Why did only one pig go to market."
2. Discuss the difference between feeder pigs and market hogs. Have students work the maze, "Pork From Farm to Your Home".
3. Students discuss and complete the Agriculture Activity Color Book page 37 and Pork Puzzlers. "Pork Jumble" activities about the pig and its meat products. Brainstorm a list of pork meats on a large poster labeled Pig Products.
4. Have the students research in the encyclopedia to find out what unusual parts of the pig are eaten and add those to the list.
5. Introduce the story, The Case of the Purloined Pork by Anita Gustafson. Have the students listen to find out what "purloined pork" means and identify pork meats mentioned in the story.
6. Explore the pork industry phrase "Everything but the Oink!" Explain that the pig provides many useful by-products, some of which are for medical and industrial purposes. Working

in teams, students will research pig by-products. On the back of the pig products poster have students list the Pig By-Products.

Extended Activities:

1. Play the game, "Driving The Pig To Market".
2. Bring a live pig or piglet to class and measure it. As a class, estimate the length, height, and weight. Then measure as accurately as possible. Write all the various measurements on the board. Have the students draw the pig to size of measurements. Try weighing the pig or have the actual weight to compare with the estimate.
3. Each student will pretend to be a Montana grocer. Feature pork as the week's special. Using food ads and pictures from magazines, students can create a poster to persuade shoppers to buy their pork products.
4. Have students collect pig by-products to design a display for the classroom.
5. Make caterpillar sandwiches or serve unusual pork samples (pigs feet, etc…) and invite guests to taste the snacks. Students love to share their pig products.
6. Color, cut, and play the story game "Can You Find My Breakfast?"
7. Students read and work pages 7-14 in Learning About Pork. Stress pork is an important part of a healthy diet.
8. Teach the song "Ham and Eggs" and "Making Breakfast". Then make a "Sunny Side Up" class booklet. Have each student describe "How to Make Breakfast" using at least one pork ingredient.

Assessment:

1. Assign "Pork parts" (page 6, Fun With Pork) to review and match the part of the pig to the meat that it provides.
2. Have students explain the meaning of "Everything but the Oink!".
3. Students write a paragraph summarizing the importance of the pig in our life.

Teaching References:

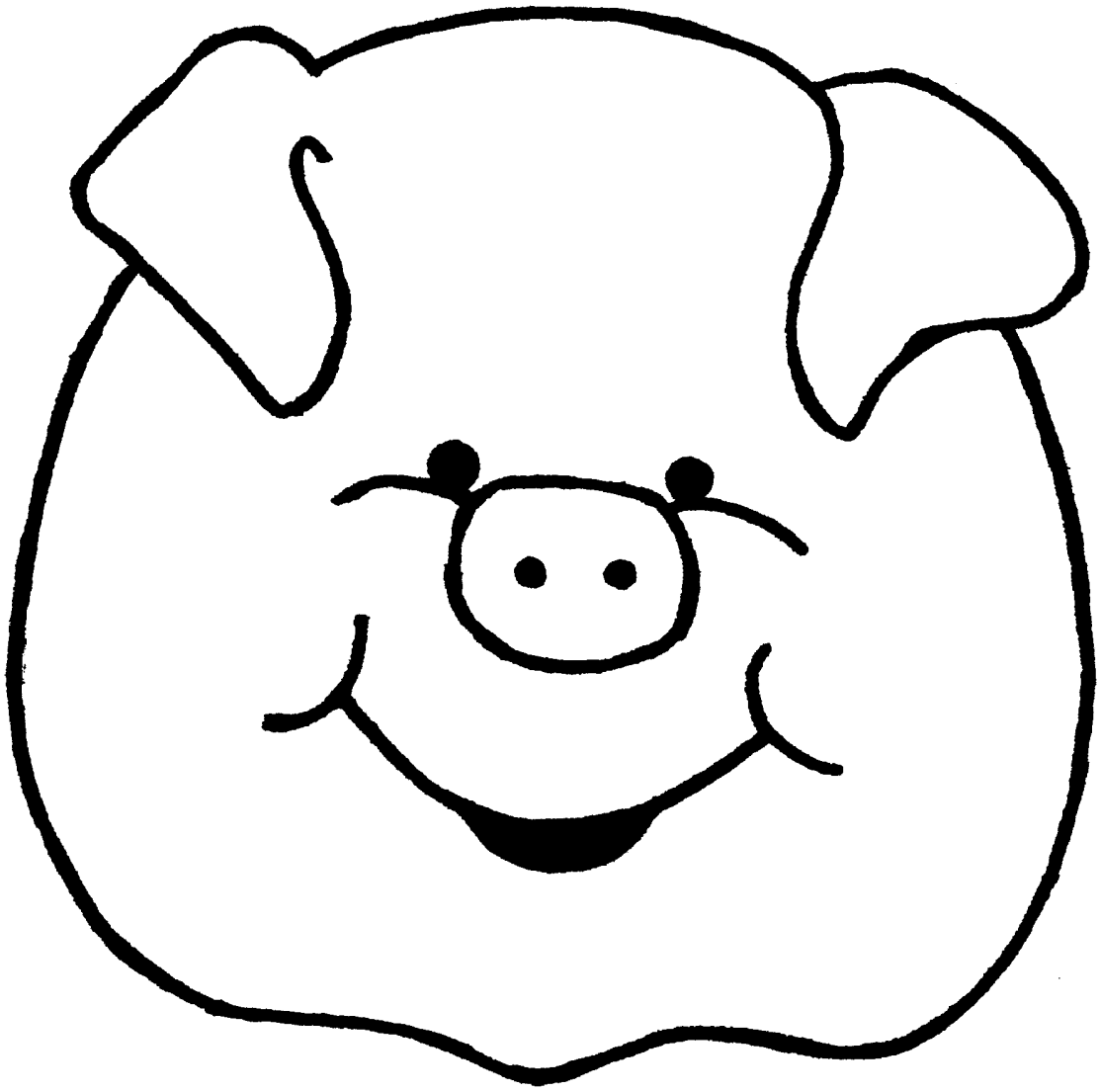
1. "Crop and Livestock Products", T-105, AMS Treasure Chest K-3 Resource.
2. "Sunny Side Up" booklet, T-69, AMS Treasure Chest K-3 Resource.
3. "Ham and Eggs"—song, Wee Sing in the Car, page 43.
4. Learning About Pork, pages 7-14, AMS Treasure Chest.
5. Agriculture Activity Color Book, page 37 (food from pigs).
6. Pork Puzzlers, page 2 "Pork Jumble", AMS Treasure Chest.
7. "Swine" facts, S-43/S-44, AMS Treasure Chest K-3 Resource Guide.
8. "Pork Industry Progress" pamphlet, "Everything but the Oink!", AMS Treasure Chest.
9. The Case of the Purloined Pork by Anita Gustafson, AMS Treasure Chest.
10. Animal Agriculture Myths and Facts—page 19, Medical contributions and products, AMS Treasure Chest.
11. AMS AG Day Mailing, March 1995, Focus On Pork:
    - History, page 5
    - The Grocery Bag, page 5
    - The Pork in a Pig, page 6
    - Hog Production, page 6
    - Pork By-Products, word search, page 7
    - Why a Hog's Not All Chops, page 7
    - Recipes: Pizza Muffins, Zippy Celery Sticks, Funny Face Pig Sandwich, page 8

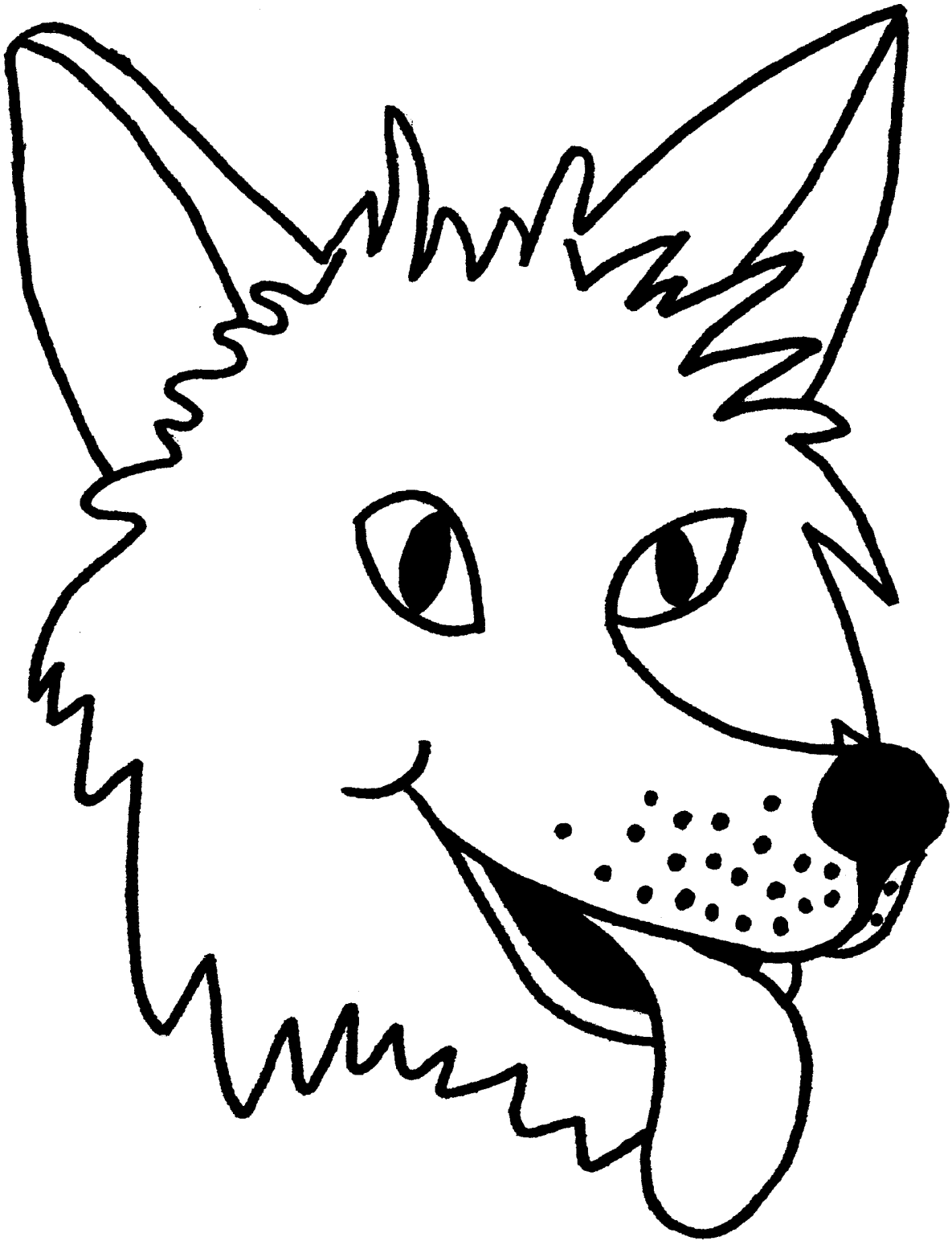
12. Fun With Pork—activity book, AMS Treasure Chest:
    - A Quick and Easy Recipe: Dippity Do-Dads, page 4
    - Pork parts, page 6
    - Pork Industry Terms, page 9
    - Caterpillar Sandwich, page 12
    - Pork From Farm to Your Home, page 15
    - Work Find—Pig By-Products, page 18
    - Color in the shapes (pig), page 19
    - Pig Glossary, page 20
13. Songs, finger plays, and games, AMS Treasure Chest K-3 Resource:
    - To Market, To Market—song, T-20
    - This Little Pig, T-36
    - Driving The Pig To Market—game, T-48
    - Making Breakfast—song, T-174
    - Can You Find My Breakfast? Action problem solving story, S-40/S-41

CHARACTER PAPER PLATE NECKLACE

Pink—Pig
Brown—Wolf

1. cut and glue characters to back of paper plate.
2. punch holes on each side and tie string to make a necklace.





THE INCREDIBLE EGG

Grades: K- 2
Subjects: Science, Math, and Literature
Approximate Time: 3-20 to 30 minute sessions
Montana Standards: Science 1, 2, and 3, Math 1, 2, 7 and Literature 1

Objectives: Students will

- Comprehend and respond to literary works.
- Explore the various characteristics of an egg and label the parts.
- Be able to distinguish between a raw and a cooked egg and explain the differences between a liquid and a solid.
- Count by 2's, 3's, and5's using pictures of eggs.

Materials Needed:

- Book: From Egg to Chicken by Dr. Gerald Legg
- Enough cooked eggs for each pair of students to have one egg
- Paper egg patterns for each student to have 25 cutout eggs
- Enough raw and cooked eggs for every two students
- 2 paper plates for each group.
- See worksheets in the Appendix A

Keywords:

Shell, Cell, Membrane, Fertilize, Yolk, Layers, Albumen, Nutritious, Chalazae, Poultry, Air sac, Protein

Brief Description:

The egg is nature's perfect home for incubating a chick embryo. It is covered with a shell that protects life until ready to hatch. The air sac at one end acts as a shock absorber. The white liquid is albumen and provides water for the hatching chick. The thick cord on each end of the yolk is the chalazae and holds the yolk in place. The yolk is the chick's food supply for the embryo which may develop from the white spot on the yolk if it is fertilized. The egg's white and yolk provide protein and cholesterol. Eggs are inexpensive and are used in many different ways for cooking. Most of the eggs we eat come from female chickens called layers. When you eat an egg, you are eating a single cell. People who raise hens place a nest in the hen house for the chickens to lay their eggs. If a chicken does not have a nest, they will build one. The egg is the symbol of birth, growth, springtime renewal, plentiful harvests, good luck, and hope. Eggs represent the beginning of life.

Lesson:

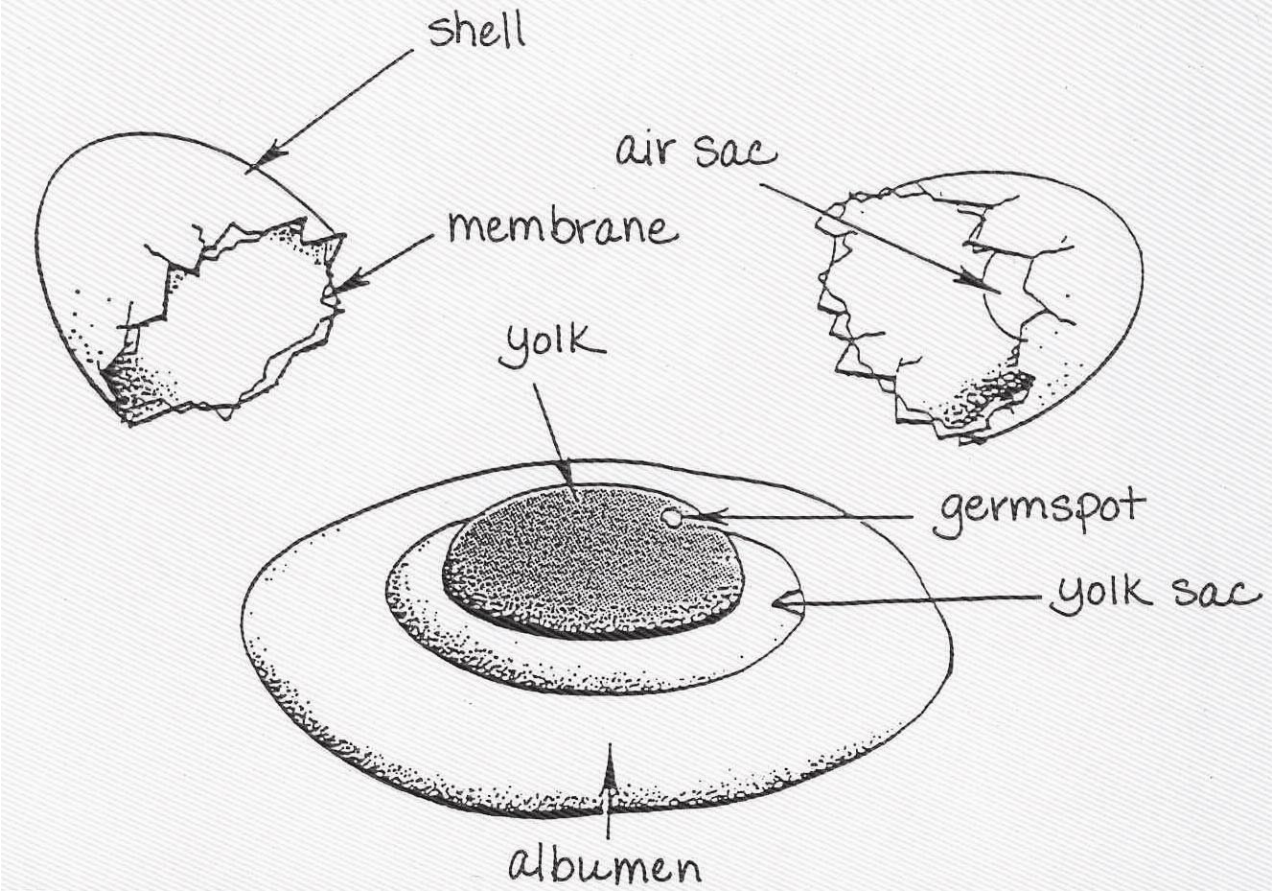
1. Inside the Egg: Read and discuss the story From Egg to Chicken by Dr. Gerald Legg. Pass out one hard-cooked egg to each pair of students. Have the students examine the e and discuss how is feels and looks. Generate as much vocabulary as possible. Peel the egg and identify the parts. Using the worksheet, label the parts correctly. For Kindergarten cut and paste the answers.
2. The Spinning Egg Trick: Give each pair of students, one raw egg and one cooked egg and two paper plates. Each student holds an egg on a plate. When told to start, each child spins its egg. Judging from the way the egg spins predict which is the raw egg and which is the cooked egg. Discuss why. Record predictions on an egg shaped chart-marked raw/cooked. The hard-boiled egg spins faster and longer because it is a soiled. The liquid in the raw egg

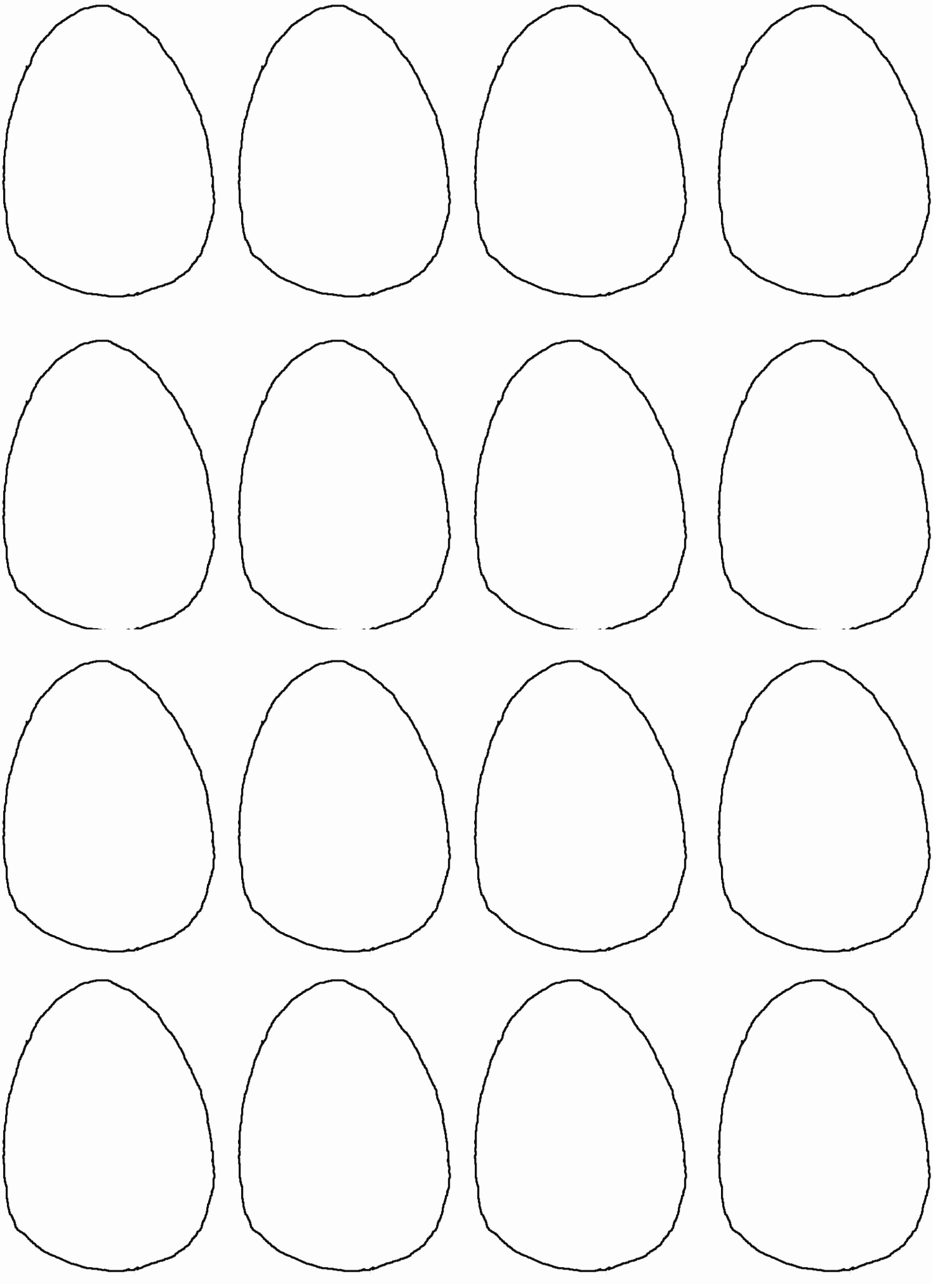
creates drag between the inside of the shell and the liquid. The drag slows down the raw egg and eventually causes the egg to stop.

3. Counts By's: Summarize the background information about chickens. Handout the paper eggs to the students. Have them cut out ahead of time. Practice building sets of 2's, 3's, and 5's. Then discuss the different ways of counting. Pass out the paper eggs. Have the students practice counting by 2's, 3's, and 5's building the sets with the paper eggs. Hand out and discuss the worksheets for the students to complete independently.

Resources:

Too Many Eggs by M. Christina Butler and David R. Godine, Horticultural Hall, Boston
Green Eggs and Ham by Dr. Seuss, Random House
The Talking Eggs by Robert D. San Souci, illustrator Jerry Pinkney, Dial Books for Young Books for Young Readers, a division of Penguin Books





CHICKENS
THE LIFE CYCLE

Grades: K-3
Subjects: Literature, Science, and Social Studies
Montana Standards: Literature 1, Science 3 & 6, Social Studies 3
Approximate Time: 3-20 minutes sessions

Objectives: Students will

- Be able to identify the parts of a chicken
- Interpret and respond to literary work
- Become aware of the life cycle of a chicken

Materials Needed:

- From Egg to Chicken by Dr. Gerald Legg
- See worksheet also in Appendix A
- Baby bird story worksheet

Keywords:

Layhouse, cheeping, grains, egg tooth, broiler, comb, layer, embryo, albumen, feathers, brooding, egg, yolk, yolk sac, milo

Brief Description:

A chicken is a bird. Birds have feathers and two wings. They start life inside an egg from which hatches a chick. Chickens provide food for humans in two forms—meat and eggs. Chickens are a very efficient way to convert feed (grain) into food for people. In Montana the principal product from poultry is the egg; most broilers come to Montana from other states. During her productive years, a hen will lay one egg a day for about 40 weeks. They are then given a rest for about three weeks, and then resume laying eggs for about 21 additional weeks. Before the 1940's most people had small flocks of hens in their backyards for eggs and meat. Since then egg farmers raise hens in layhouses. These homes are temperature, humidity, and light controlled. Automatic feeds move through for the hens to eat with clean water is always close for them to drink.

Chickens are fed a balanced diet of corn, wheat or milo grains and soybean meals. Vitamins and minerals are added to their food. Most chickens eat a better-balanced meal than some humans. The goal of an egg farmer is to raise a healthier hen. Egg farmers know that they need to put the hen first.

Lesson:

1. Egg to Chicken: Read and discuss the story From Egg to Chicken by Dr. Gerald Legg. Discuss the life cycle of the chicken. Pass out the life cycle of a chicken worksheet and complete together discussing various stages.
2. Hand out the worksheet for students to label the different parts of a chicken; they can also color their chicken.

Additional:

3. Have students complete the baby bird story worksheet.

Vocabulary:

Albumen—the white part of the egg which surrounds the growing chick

Brooding—when a hen looks after her eggs by keeping them warm

Cheeping—the noise that chicks make so that their mother knows where they are

Comb—the bright red crest on top of a chicken's head

Egg—contains the baby bird

Egg tooth—a tiny tooth-like point on the tip of the beak of a newborn chick. The chick uses the egg tooth to break through the eggshell

Embryo—the early stage of a young animal before it can move and before it resembles its parents

Feathers—the soft, light, and often colorful covering of birds

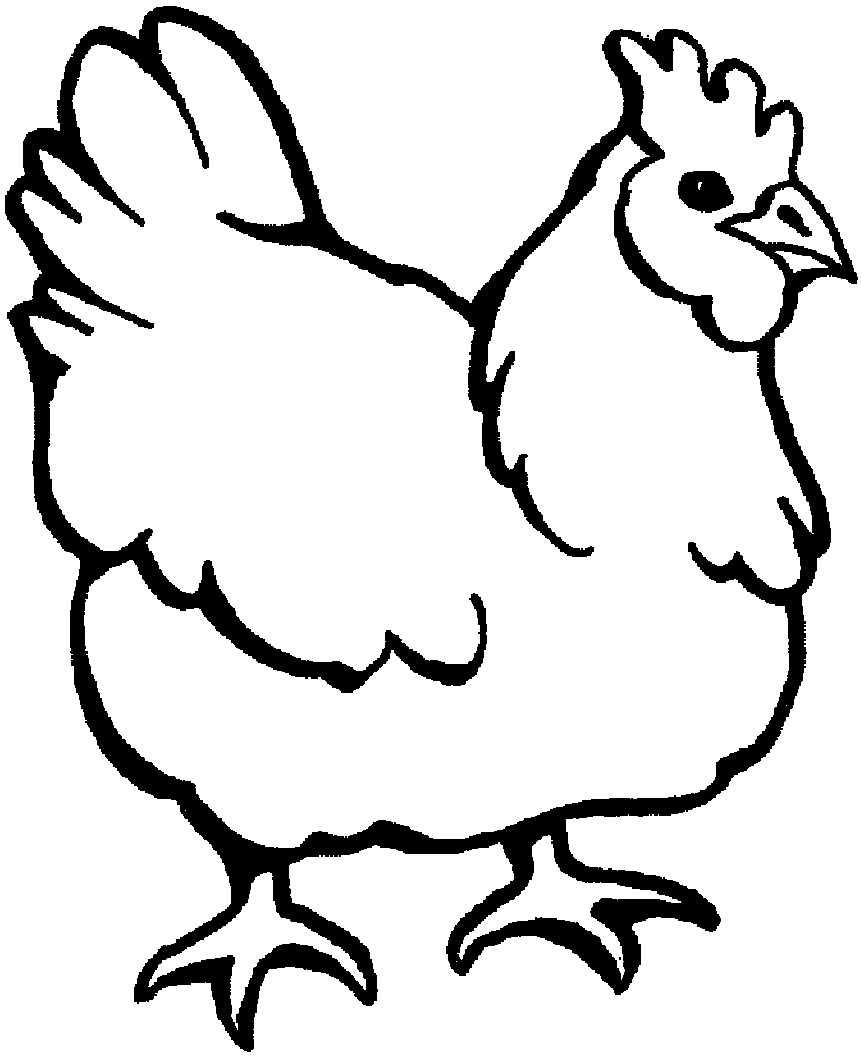
Membrane—a very thin inside covering of the egg shell

Nest—a hollow place built or used by a home to rear its young

Shell—the hard covering of an egg which protects the growing chick

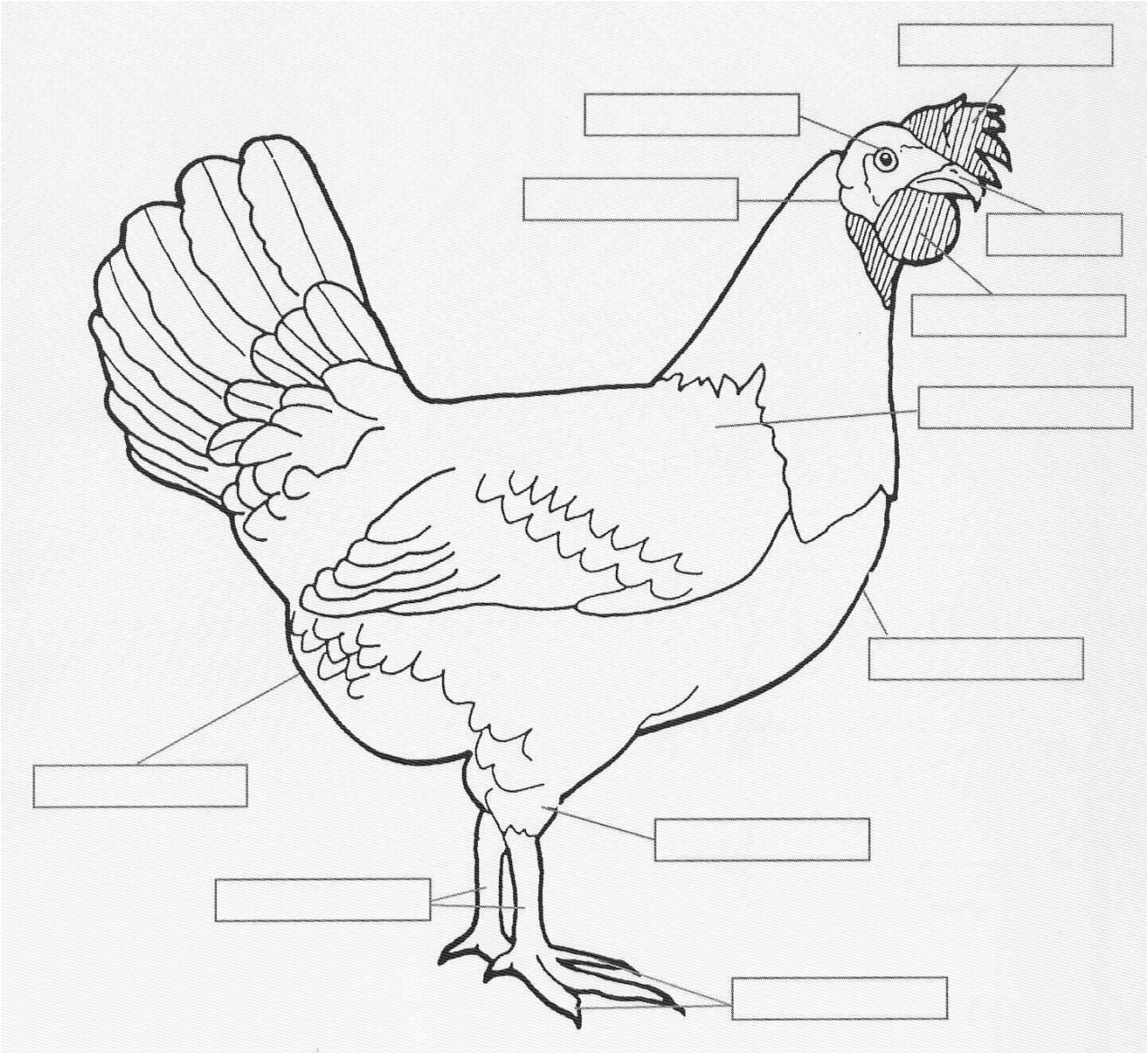
Yolk—the yellow part of an egg which is used as food by the growing chick

Yolk sac—a sack that protects the yolk



PARTS OF A CHICKEN

Color and label the parts of a chicken



Use each word only once:

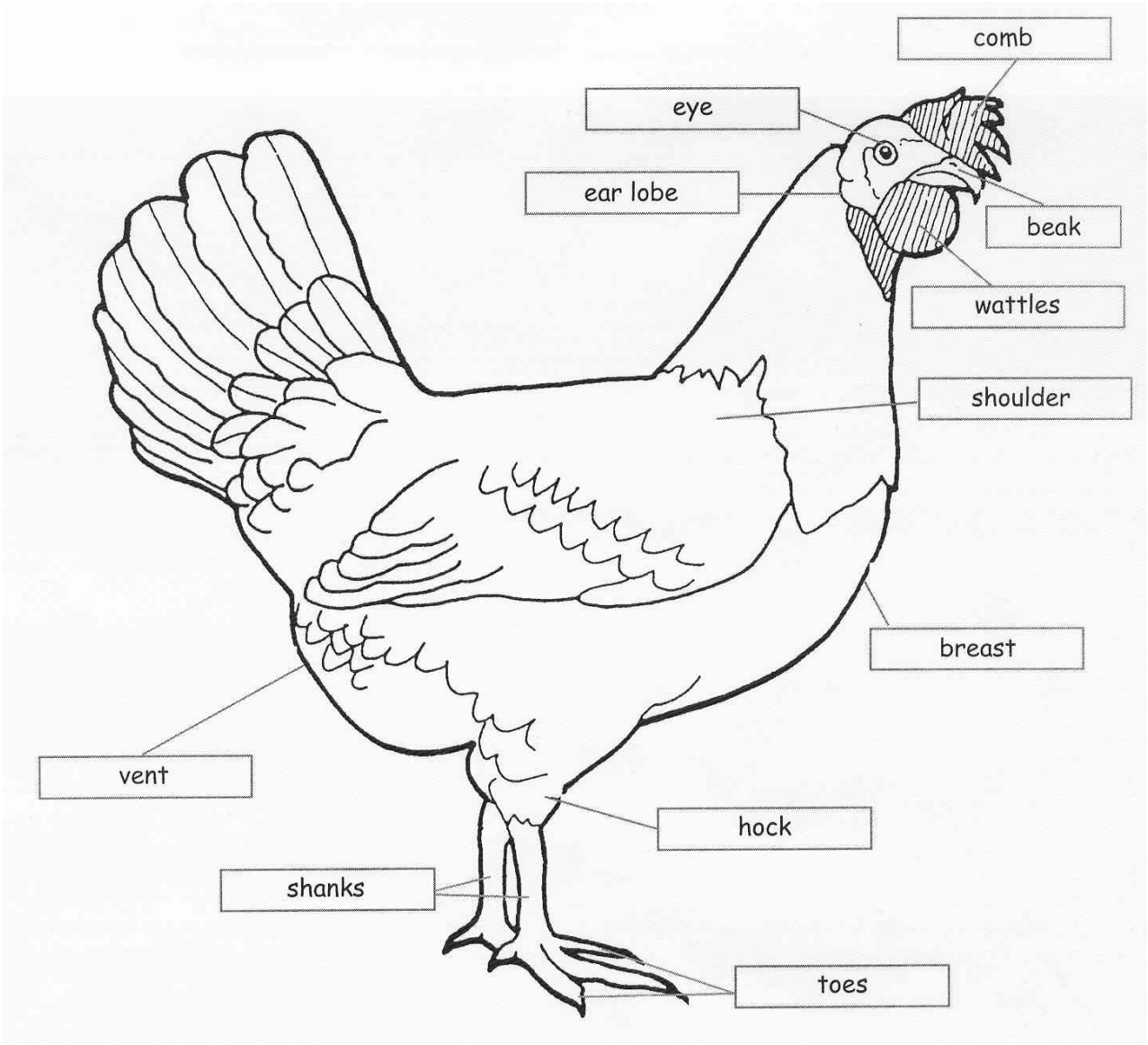
beak	breast	comb	ear lobe
eye	hock	shanks	shoulder
toes	vent	wattles	

This worksheet is part of the Incubation and Embryology Project. University of Illinois Extension, 1999.

PARTS OF A CHICKEN

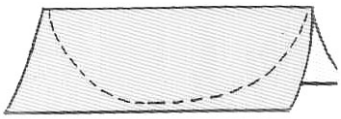
Color and label the parts of a chicken

KEY



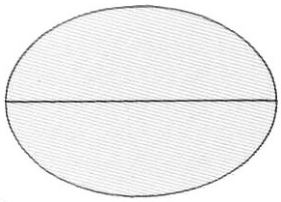
BABY BIRD STORY

A-Fold-And Cut Story

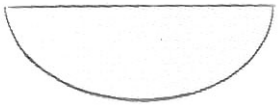


(Have ready in your lap orange 9x12 construction paper, scissors, and a black felt pen.)

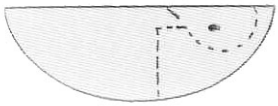
One spring day a mother bird and a father bird began to build a nest. It took them a long time because they had to carry many pieces of string and grass twigs high up into the branch of a tree. When they finally finished, it looked like this: (Fold paper in half lengthwise and cut as shown on dotted line.)



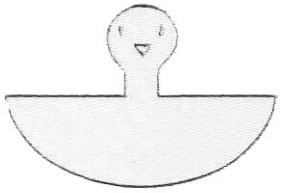
Then the mother bird sat down on the nest and laid a beautiful egg, and the egg was shaped like this: (Unfold nest and show egg shape.) The egg was far down into the nest where no one could see it. (Fold back into nest shape again.)



Now the mother bird had to sit on the egg to keep it warm. She had to sit there for an awfully long time…on hot days, rainy days, and cold days. So she was very glad when the two little black bug came along to keep her company. They had nice long talks, and that made the day more pleasant for her. (Make two black dots, one on each side of the nest, near the top, one-third of the way from the end.)



At last the time came for the egg to hatch, and the mother bird heard a crackling noise. She looked down to see that there were some cracks in the egg. The cracks got bigger and bigger. (Cut as indicated by dotted lines.) Finally, the egg broke in half, and out come…guess what? A baby bird! (Fold top part of egg down, and fold bill up slightly.)



FROM EWE TO YOU

Grades: K-3
Subjects: Language Arts, Science, and Social Studies
Montana Standards: Art 1, Literature 1, Reading 1; Spelling & Listening 1, Writing 1, Science 1 & 6, Social Studies 3
Approximate Time: 3-45 minutes

Objectives: Students will

- Learn how wool is spun into yarn.
- Construct a hand spinner and spin wool.
- Recognize the "real wool" logo.
- Learn the difference between sheep products and sheep by-products.

Materials Needed:

- Cloak/shawl
- Wool
- Empty thread spools
- Pencils or dowels
- Wool yarn samples
- Wool fabric samples
- Wool clothing: socks, sweater, pants
- Small loom
- Knitting needles
- Knitted samples
- Pure wool logo
- Story books
- Activity sheets

Keywords:

Cloak, shawl, spinning, weaving, weave, drop spindle, spinning wheel, knit, woven, loom, logo, products, by-products

Brief Description:

Sheep give us so many things. They grow wool that is sheared once a year. The wool is then cleaned and carded to make the fibers straight. Then the wool fibers are ready to be spun or twisted into yarn. The yarn is knitted or woven into cloth. Today there are machines that knit and weave the fabrics. Sheep also give us meat and many by-products from other parts of their bodies.

Lesson:

1. Display a wool cloak. Ask students to describe it and explain what kind of clothing it is. Have them explore it by touching and looking closely at the fabric. Before reading the story Charlie Needs A Cloak, ask, "Why does Charlie need a cloak and how will he get it?" Following the story, students will discuss their answers and review the process of how wool is made ready for weaving.
2. Have students work in pairs to construct a hand spinner (AMS T-84) with a wooden spool and pencil or dowel. Use wool that is clean and carded ready to spin (lesson "Some Wooly Good News!"). Students will spin wool and then display their yarn. The Source, p. 29-32, reviews the process of "wool fibers to sweater". Show woolen items such as socks,

sweater, or pants. Discuss the knitted or woven cloth and check the weave. If possible, demonstrate how to knit yarn and view woven cloth on a loom.

3. Talk about what sheep give us using Wool and Sheep Activity Book, p. 10, "Sheep Products". Using a sheep-shaped poster, record lists of products and by-products that are made from sheep. Students will make a sheep-shaped booklet to list the sheep products and by-products they have used.

Extended Activities:

1. Make a display of wool items collected by the students. (K-3)
2. Use "A Wooly Story", p. 29 (Mailbox), for sequencing wool process. (Grades 2-3)
3. Invite a spinner to demonstrate how to spin wool on a spinning wheel. (K-3)
4. Read Weaving the Rainbow and create a yarn wool weaving. (Grades 1-3)
5. Activity sheet, "Problem: How to reward sheep production in Montana's economy?" review more sheep facts. (Grades 2-3)
6. Students can collect and display sheep by-products. (K-3)

Assessment:

1. The sheep activity, "From Sheep to Sweater", pages 39-40, (Project Seasons) will help students recall steps to making a sweater from wool by sequencing pictures or props. (K-3)
2. Show students a shawl and have them read "Charity's Shawl" (AG Day Mailing). Ask them to answer the questions by matching the correct picture. Students will need to remember facts about processing wool. (Grades 2-3)
3. Using p. 25 from the Wool and Sheep Activity Book, students will review what they have learned about sheep. (Grades 2-3)

Teaching References:

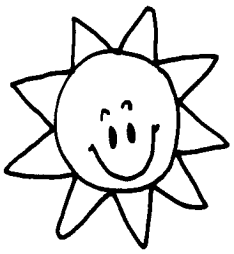
1. Wool and Sheep Activity Book, p. 10, 14-15, 25, 28, 31 – Colorado Foundation for Agriculture
2. How To Make Books With Children, p. 21 "Lamb Book" - Joy Evans and Jo Ellen Moore
3. "A Wooly Story", p. 29 – The Mailbox, April 1984
4. "Fleece to Fabric" poster, American Wool Council – AMS Treasure Chest
5. Project Seasons, P. 39-40, "From Sheep to Sweater", Deborah Parrella, 1997
6. "Problem: How to reward sheep production in Montana's economy?" p. 26, Agriculture and Water Activity Book – WIFE (Montana Women Involved in Farm Economics) – AMS Treasure Chest
7. Charlie Need A Cloak, Tomie de Paola – AMS Teacher's Library
8. Weaving The Rainbow, George Ella Lyn and Stephanie Anderson
9. "Wool From Sheep To You", section called "Spinning Yarn", p. T-84 – AMS K-3 Resource Notebook
10. "Charity's Shawl", p. 8, - AG Day Mailing, January 1997 (Grades 2-3)
11. The Source, p. 29-32, Elizabeth Wolanyk – AMS Teacher's Library
12. "Sheep Products Find Many Uses/Americans Appreciate Sheep Products", American Sheep Industry – AMS Treasure Chest
13. "Just A Few Products Brought To You By Sheep", American Sheep Industry – AMS Treasure Chest
14. "Wool Information: Woolen Products and Types of Woolen Fabrics", p. WS-256 – AMS Treasure Chest
15. "ASI Sheep Reporter" – AMS Treasure Chest

A WOOLY STORY

Read the story. Cut and paste the sentence strips below in the correct order.

In the spring, Charlie shears the wool off his sheep. First, he washes the wool and then cards it to straighten it out. He spins the wool into yarn. He dyes the wool with berries to make a cloak.

Paste sentences in correct order.



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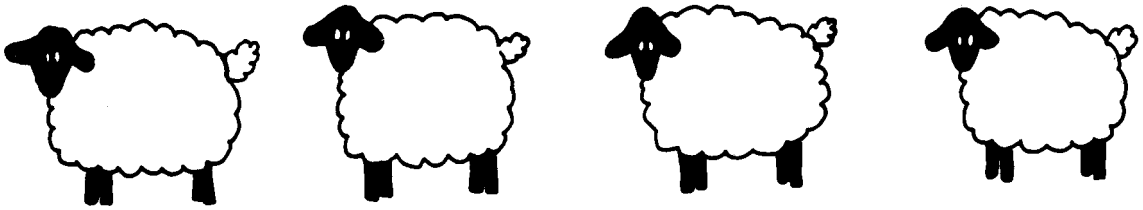
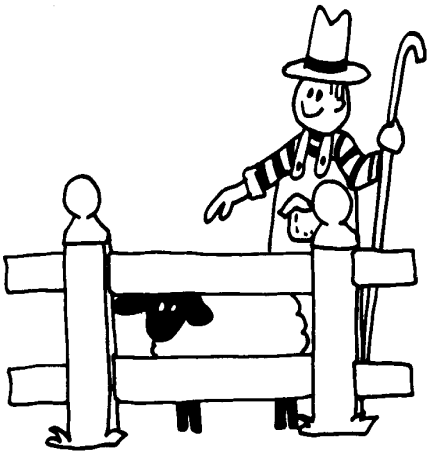


Cut.

He spins the wool into yarn.
Charlie washes his wool.
Charlie shears the wool off.
Charlie makes a new cloak.
Next, Charlie cards the wool.



SHEEP FARMING

Grades: K-3
Subjects: Language Arts, Math, Social Studies, Science, and Art
Montana Standards: Spelling1&2, Art1&6, Reading1&4, Literature1&5, Media Literacy1, Writing1&2, Math1&5; Social Studies3; Science3
Approximate Time: 4-30 minutes

Objectives: Students will

- Learn about sheep farming.
- Study the sheep family unit.
- Understand the difference between a lamb and a bum lamb.
- Explore the feed for sheep.
- Learn about sheep predators and how sheep can be protected.

Materials Needed:

- Story books
- Wool
- Bum lamb
- Bum bottle
- Lamb powdered milk
- Part of a bale of hay
- 2 Buckets
- Plastic tubs
- Stock salt
- Mineral block
- Weight scale
- Measuring cups
- Worksheets

Keywords:

Pasture, barn, sheep shed, dry lot or corral, trough, sheep jugs, herder, sheep wagon, herding, herd, flock, grazing, ewe, ram, lamb, buck, wether, bleat, twins, triplets, suckle, orphan/bum, weaned, vaccinate, docking, grain, guard animals, predators

Brief Description:

Sheep are raised all over the United States and in other parts of the world. A female sheep is called an ewe and the male sheep is called a buck, ram, or wether. A sheep that is younger than a year old is called a lamb. Sheep grow wool on their bodies to keep them warm and dry. A lamb is born with a tail, but the tail is docked (cut off) to help keep the sheep clean and healthy. They do not have any front teeth and still can eat grass.
Sheep have three extra parts to their stomach that allows them to eat and digest the grass. People and most other animals cannot digest grass because they only have one part to their stomach. (Diagrams in ASI Sheep Reporter) Sheep are important to us because they give us wool and food.

Lesson:

1. Sing "Old MacDonald Had a Farm" to introduce the story Hooray for Sheep Farming! By Bobbie Kalman. Read pages 4-19 and discuss the farm, sheep, and guard animals. Students will label a farm map (AMS: K-3 p. S-6) and include drawings of a guard dog with sheep. Have prepared a Math center with a bucket of stock salt, a bucket of grain, part

of a bale of hay, and a mineral block. Teams of students take turns in the center to first estimate weight and cup measure of the feed. Next, they will actually do the weighing and measuring. The findings will be recorded on the Math sheep sheet.

2. Students will read color book story, I Love Lambs. Discuss sheep facts and special vocabulary. Review vocabulary with work sheet "Sheep Words" p. 2 (Wool and Sheep Activity Book). Read "Welcome Baby Lambs!" p. 4-6 (Wool and Sheep Activity Book) and complete the math, comprehension, and spelling activities. If possible, introduce a visiting bum lamb, mix its milk, and feed the lamb with a bottle. Take pictures of the lamb and students to create a bulletin board display: How to Feed a Bum Lamb".
3. Sing "Mary Had a Little Lamb" and continue singing by changing the name. End with the name "Audrey" to introduce the book My Sheep by Heather Miller. Talk about the story and ask this riddle: Do you know a song that sheep can sing? (Baa, Baa, Black Sheep) Students will glue wool to worksheet p. 13: "Sheep-We get wool from sheep" and write a description of their lamb.
4. Remind students that sheep need to be protected from predators such as coyotes, fox, wolves, lions, or bears. Discuss the importance of guard animals. Conclude by making or serving the recipe "Sheep Dogs" page 7 from Spurrin' the Words.

Extended Activities:

1. Students can read: Little Rabbit's First Farm Book by Alan Baker and Little Farmer Joe by Ian Whybrow and Christian Birmingham. (K-3)
2. Color pages in the I Love Lambs color book. (K-3)
3. "Can You Solve It?" Math story problems from Wool and Sheep Activity Book p. 23. (Grades 2-3)
4. Sing "Little Bo Peep" and act out the song. (K-3)
5. Color the states that have sheep production. The United States map reference is in the ASI Sheep Reporter. (K-3)
6. Students can discovery special uses for sheep by reading p. 9 "Sheep Have Special Uses", p. 15 "How can wool help the environment?" (Wool and Sheep Activity Book). Discuss "Sheep and Noxious Weed Control" (BLM) and "Sheep are good for the world around us!" (Sheep Reporter). (Grades 2-3)

Assessment:

Students should understand and be able to describe the sheep family structure. Plan a field trip to a local sheep farm and have students keep a journal of their trip. They may use drawings and writing to describe what they have learned.

Teaching Resources:

1. K-3 Farm Map p. S-6 - AMS Treasure Chest Resource Notebook
2. "The Sheep Industry in America", American Sheep Industry Women - AMS Treasure Chest
3. ASI Sheep Reporter: All About Sheep - AMS Treasure Chest
4. Hooray for Sheep Farming! , pages 4-19, Bobbie Kalman - AMS Teacher's Library
5. My Sheep by Heather Miller - AMS Teacher's Library
6. "Montana Country: Cattle, Sheep, and Pigs", 12 minute video - AMS Treasure Chest
7. Sheep, My Good Friends On The Range coloring book – "Ewe Color It", American Sheep Industry Women

8. Wool and Sheep Activity Book, Bette Blinda, Colorado Foundation for AG, pages 2, 4-6, 9,15, 23
9. Thematic Unit: Farm Animals, p. 13, "Sheep-We get wool from sheep", Teacher Created Materials, Inc.
10. Website: www.sheepusa.org
11. Invite a sheep producer and a bum lamb to feed
12. Little Rabbit's First Farm Book, Alan Baker - AMS Teacher's Library
13. Little Farmer Joe, Ian Whybrow and Christian Birmingham - AMS Teacher's Library
14. Spurrin' the Words, a leader's guide, p. 7- Cowboy Poetry Project, 2004, MSU Extension Service
15. Wee Sing Nursery Rhymes and Lullabies, Pamela Conn Beall and Susan Hagen Nipp
16. "Sheep and Noxious Weed Control", BLM, U.S. Forest Service, Bureau of Reclamation – AMS Treasure Chest.

SHEEP DOGS

1 dozen hot dogs
6 cups mashed potatoes (instant)
2 cups shredded cheese

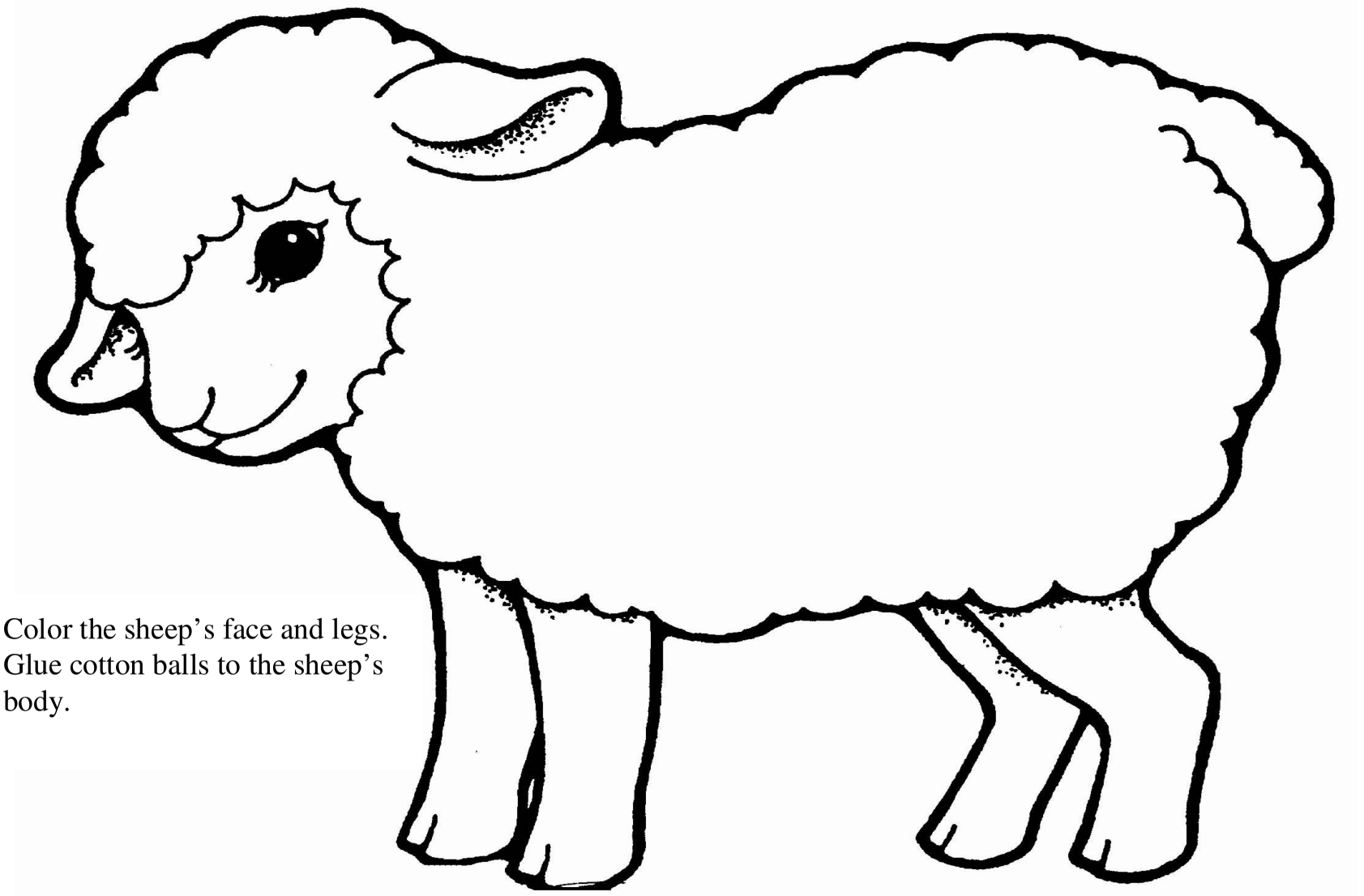
Wooly weenies are meant for the out-of-doors! For the home on the range, Sheep Dogs are the perfect snack. When you need to ride herd, get a dozen hot dogs and slice them lengthwise without cutting all the way through.

Place on a baking sheet. Spoon ½ cup of mashed potatoes into each slit. Top with cheese and bake at 350° for 20 minutes.

When the dogs are sizzling and the cheese is melted, whistle to bring everyone to the table.

Name _____

SHEEP

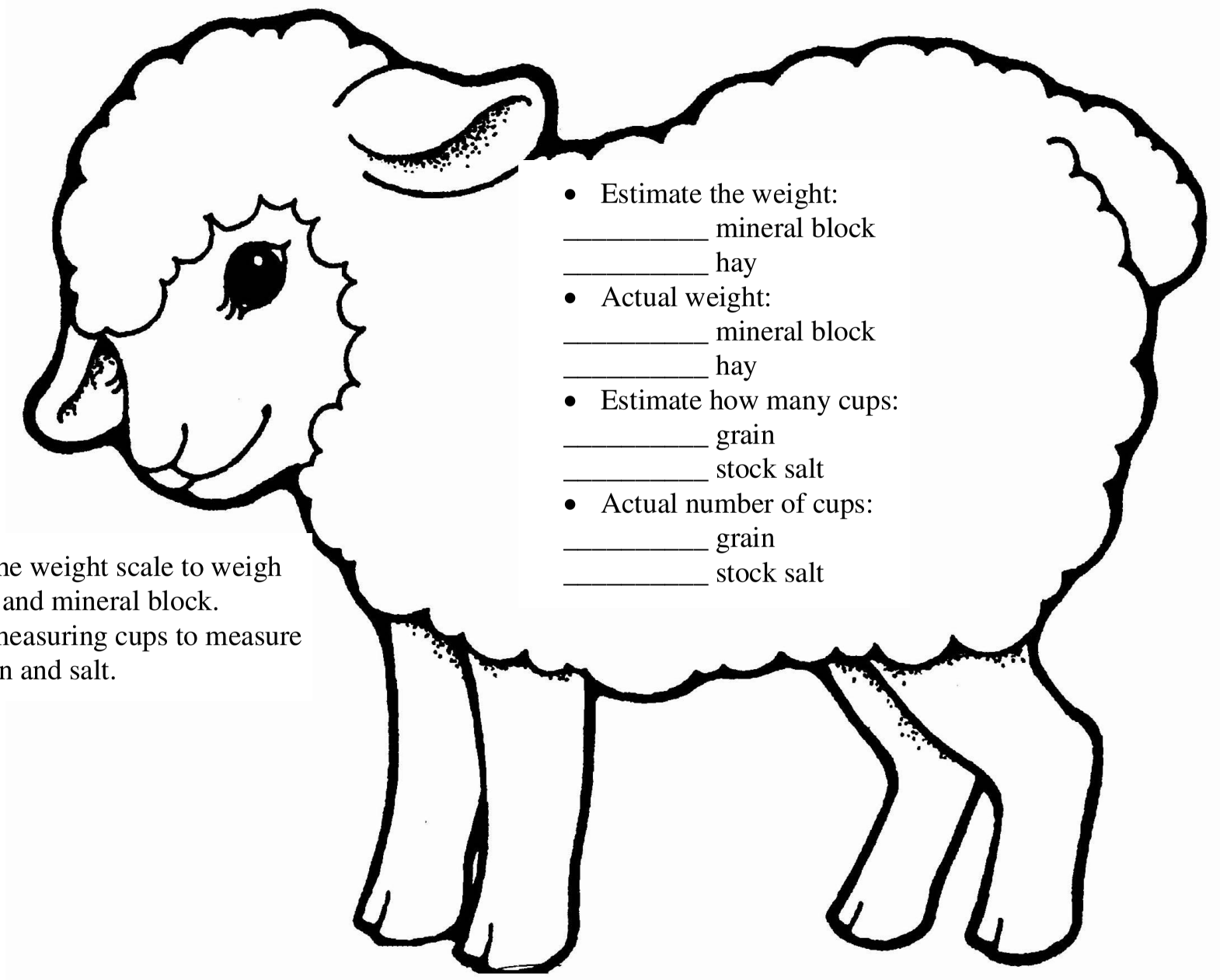


1. Color the sheep's face and legs.
2. Glue cotton balls to the sheep's body.

We get wool from sheep.

MEASURING FEED

Name _____



- Using the weight scale to weigh the hay and mineral block.
- Using measuring cups to measure the grain and salt.

- Estimate the weight:
  _____ mineral block
  _____ hay
- Actual weight:
  _____ mineral block
  _____ hay
- Estimate how many cups:
  _____ grain
  _____ stock salt
- Actual number of cups:
  _____ grain
  _____ stock salt

SOME WOOLY GOOD NEWS!

Grades: K-3
Subjects: Language Arts, Math, Science, and Social Studies
Montana Standards: Literature 1, Spelling/Listening 1, Writing 1, Math 5, Science 1, and Social Studies 1
Approximate Time: 3-30 minutes

Objectives: Students will

- Learn about wool.
- Compare and discuss wool characteristics.
- Discover how wool is processed.
- Learn why wool is an important animal fiber.

Materials Needed:

- Wool samples
- Hand magnifying glasses
- Microscope
- Rulers
- Soap flakes
- Hot Water
- Small tubs
- Wool cards
- Combs
- Paper towels
- Lanolin lotion
- Worksheets
- Wool fleece
- Shears
- Story books

Keywords:

Shears, shearing, shorn, fleece, fiber, wool crimp, scoured, picked, wool card, carded

Brief Description:

Sheep give us a natural fluffy fiber called wool that grows like hair all over the sheep's body. Most sheep are usually sheared once a year in the spring before lambing. Because there are so many different kinds of sheep, there are different kinds of wool. Wool can be white, black, gray, or red. After shearing, the fibers are graded according to length and diameter. The value of the wool is determined by how clean the wool is and the grade of wool. Next, the wool is scoured (cleaned), picked (particles removed), and carded (combed). Finally, it is ready to be spun into yarn.

Lesson:

1. Have students sing "Baa, Baa, Black Sheep". Sing it again changing the verse to white sheep. Read pages 25 to 28 from The Source by Elizabeth Wolanyk to review where wool comes from and introduce how it is processed. Discuss and if possible, share a wool fleece, shears, and a sheep card. Review comprehension and vocabulary with worksheets p.12-13, "Sheep Give Us Wool!" and "Wool Is A Natural Fiber" (Wool and Sheep Activity Book-Colorado).
2. Discuss the poster "Wool Grades and the Sheep That Grow the Wool" and AMS wool samples. Provide a wool sample and a hand magnifying glass for each pair of students. Have students compare and describe their wool fibers by color, texture (lanolin/lotion), and tightness of the crimp (springiness). Using a microscope, the students will be able to compare the diameter (width) of the fibers. Sharing wool samples, the students should try

to collect an example of fine, medium, and coarse wool. Pictures on pages 20-21 of Hooray for Sheep Farming by Bobbie Kalman will help the students reference their samples. Glue and label samples of wool on the "fleece shaped worksheet".

3. Demonstrate how to scour (wash), pick (clean), and card (brush) wool following directions in "Wool From Seep To You" (AMS p. T-84). Working in groups, give students the opportunity to process their wool. Lay the clean wool samples on paper towels to dry.
4. In conclusion: What is clean wool used for? Why is wool an important animal fiber? Do you have anything that is made from wool? Bring it to school in a "Mystery Bag" for Show and Tell.

Extended Activities:

1. "Where Wool Comes From" p.14 - Silver Burdett (K-3)
2. Have groups of three students each measure and cut 3 inch samples of wool fiber. After stretching each sample and measuring again, display the wool samples shortest (fine) to longest (coarse). (Grades 2-3)
3. Spelling Riddle: "Where does a lamb go when it needs a haircut?" (Grades 2-3)
4. Plan a field trip to watch sheep shearing.

Assessment:

Students should understand where wool comes from and how it is processed. As a group, have students discuss the coloring book (copied without the original captions), "Sheep Are My Good Friends", which reviews vocabulary and the wool processing. Assign students to color and write a description for each page. (Grades 2-3)

Teaching Resources:

1. Harvesting, Preparing, and Selling Montana Wool: p. T-97-99 K-3 - AMS Treasure Chest K-3 Resource Notebook
2. "Sheep" p. T-83 or S-53 (8-10) - AMS Treasure Chest K-3 Resource Notebook
3. "Wool Grades and the Sheep That Grow The Wool: American Wool Council - AMS Treasure Chest
4. The Source – AG in the Classroom by Elizabeth Wolanyk, pages 25-28 - AMS Teachers' Resource Library
5. Hooray For Sheep Farming , Bobbie Kalman, pages 20-31 - AMS Teachers' Resource Library
6. ASI Sheep Reporter: All About Sheep - AMS Treasure Chest
7. Wool Information and Wool Production pages WS-256, 257 - AMS Treasure Chest
8. Fact Sheets #1-8 "Processing Wool", American Wool Council - AMS Treasure Chest
9. Wool Samples - AMS Treasure Chest
10. Wool and Sheep Activity Book – Colorado Foundation for Agriculture, P.O. Box 10, Livermore, CO 80536; phone 970-881-2902
11. Fleece shaped worksheet.
12. Sheep Are My Good Friends – American Sheep Industry Women, "Ewe Color It"
13. The Teacher's Pet - The Learning Works, Inc. 1983, "Spelling Riddle" p. 92
14. Local county extension agent or sheep producer: fleece, shears, wool cards
15. Website: www.americanwool.org
16. "Wool From The Sheep To You", p. T-84 – AMS Treasure Chest K-3 Resource Notebook
17. "Do You Know The Unique Qualities Of Wool?" , American Sheep Industry – AMS Treasure Chest
18. "Where Wool Comes From", p. 14 – Silver Burdett 1982 (Textbook Chapter 4)

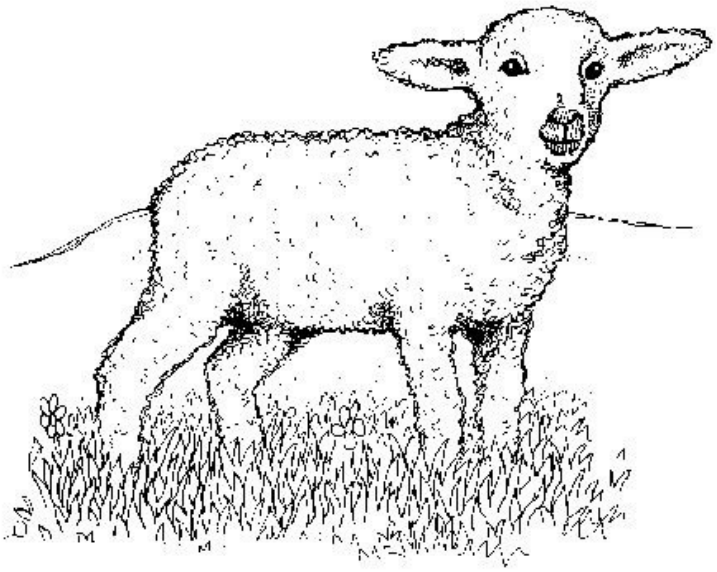
Name _____

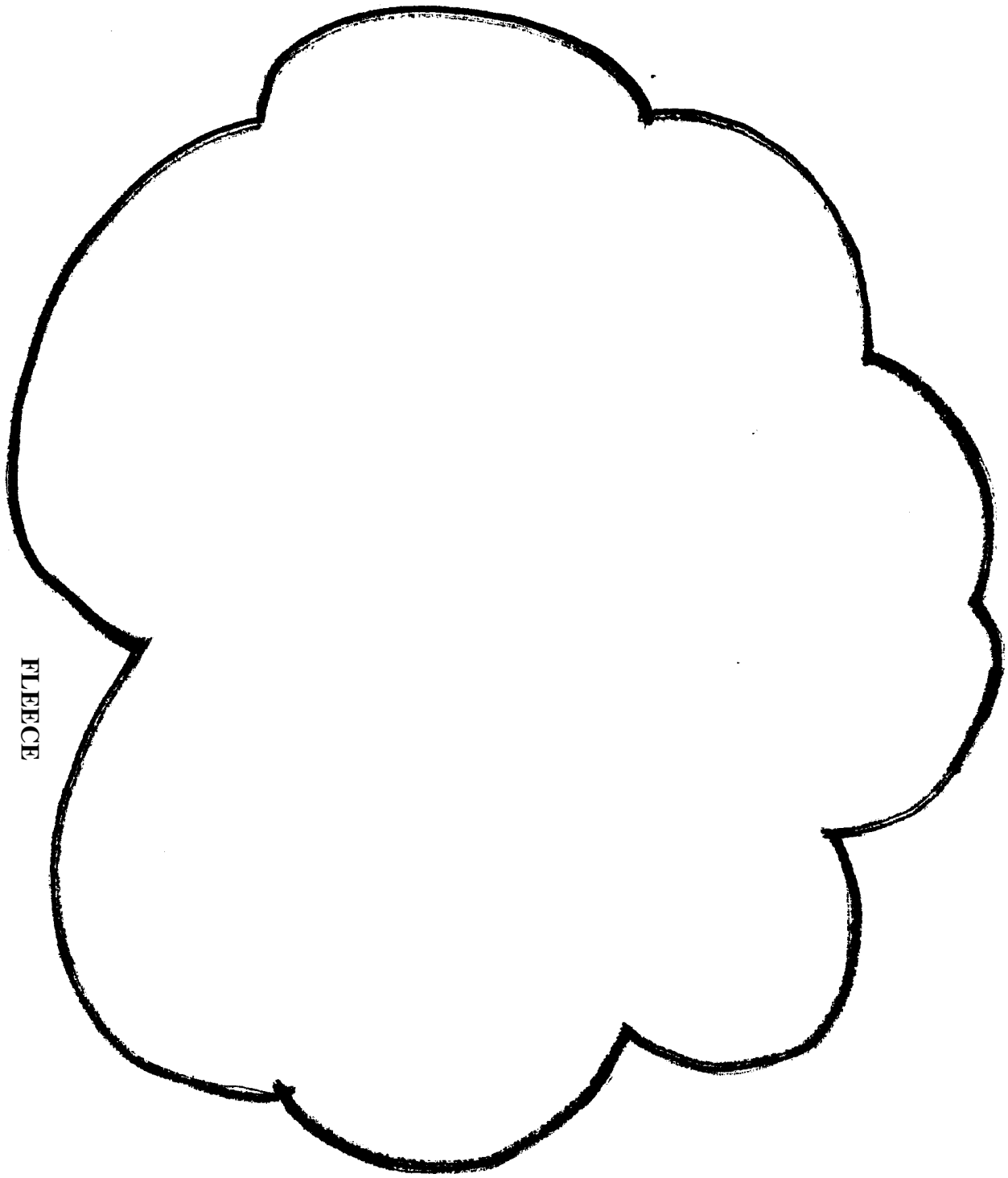
Spelling Riddle

Find the letter in front of the correct spelling of each word, and write it on the line at the bottom of the page to solve the riddle: *Where does a lamb go when it needs a haircut?* The first one has been done for you.

1.	**s** gramar	**b** grammer	**t** grammar
2.	**o** separate	**a** seperate	**e** sepurate
3.	**r** accomodate	**t** accommodate	**e** acommodate
4.	**h** business	**n** bisiness	**o** busines
5.	**b** embarras	**o** embarass	**e** embarrass
6.	**s** miscellanious	**r** misscellaneous	**b** miscellaneous
7.	**a** familiar	**s** familar	**g** famillure
8.	**a** experience	**r** expereince	**j** expireance
9.	**n** judggment	**l** judgemint	**b** judgment
10.	**k** surprize	**a** surprise	**j** sirprise
11.	**b** occured	**y** ocurred	**a** occurred
12.	**s** necessary	**t** necesery	**l** neccessery
13.	**h** leisure	**e** leezure	**y** liesure
14.	**c** lisence	**d** licenze	**o** license
15.	**p** excellent	**e** exsellent	**a** excellant

T ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___

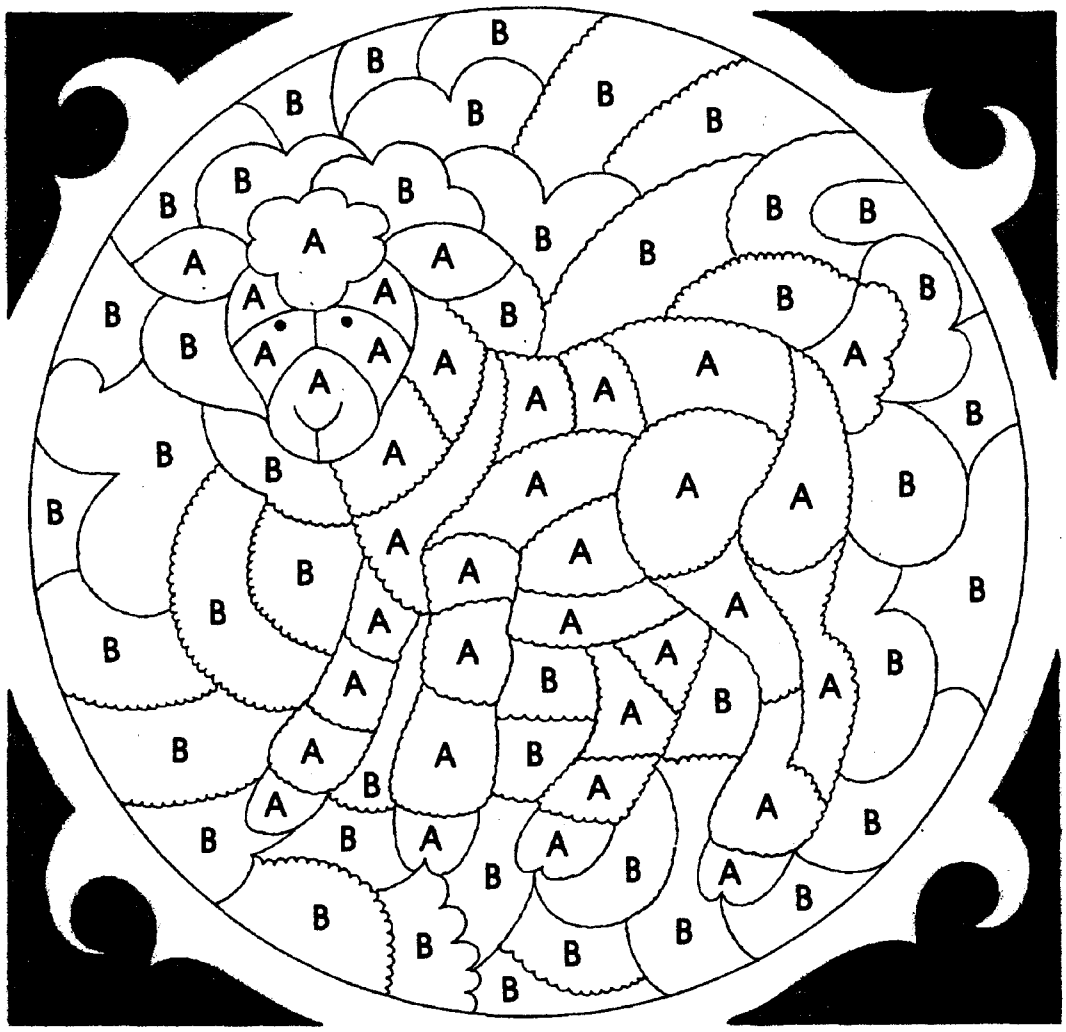



FLEECE

Name _____

WHERE WOOL COMES FROM

Some clothes are made of wool. Color the picture to find out where wool comes from. Then fill in the blank.



Wool comes from _____


Natural
Resources

THE WORM SHALL SQUIRM

Grades: K-3
Subjects: Science, Writing
Montana Standards: Science 1, Writing 1
Approximate Time: 20 minutes, plus time 3 days later

Objectives: Students will

- Learn about cycles in nature
- Observe earthworms and learn how they are beneficial to our environment.
- Identify and describe characteristics of earthworms.

Materials Needed:

- "The Outside of a Worm" handout
- Two jars
- Lids with holes
- Dark soil
- Sandy soil (bright color)
- Two earthworms
- Carrot scraps
- Dark paper (two pieces)
- Masking tape
- Water

Keywords:

Recyclers, burrows, castings

Brief Description:

Earthworms live in warm, moist soil throughout the world. Earthworms can be found in many different sizes. The smallest earthworm can be only one millimeter long and the longest can be 11 feet long!

Earthworms are great recyclers because they take food scraps and other decaying matter in the soil and turn it into nutrients for plants. As the worm digs, it eats. The earthworm eats dead plants and animals, soil, sand and even small pebbles. An earthworm eats as much as it weighs each day. At night a type of earthworm called a night crawler will tunnel above ground and leave its droppings. These droppings are called castings.

An earthworm will also break up leaves. After the leaves are in small pieces the worm will drag them into its burrow. It will eat these later.

How do earthworms move? Earthworms have two sets of muscles. They have circular muscles around each segment, and long muscles that run the length of the body. When the circular muscles tighten, the earthworm becomes longer and thinner. When the lengthwise muscles tighten, the earthworm becomes shorter and fatter.

Lesson:

1. Handout and discuss "The Outside of a Worm".
2. In the bottom of each jar, put a layer of dark soil about one inch thick. On top of this, place a one-inch thick of light sandy soil. Keep adding layers until the jar is half full.
3. Slightly moisten the soil in both jars with water.
4. Place the two earthworms in *one* jar, and then add some carrot scraps to both jars.
5. Put a lid on each jar. Label the jar with earthworms as "Earthworms" and label the other jar "No Earthworms."
6. Take the dark pieces of paper and wrap around each jar. Tape tightly. Put the jars aside.
7. Have each student write down their predictions about what will happen in each jar.

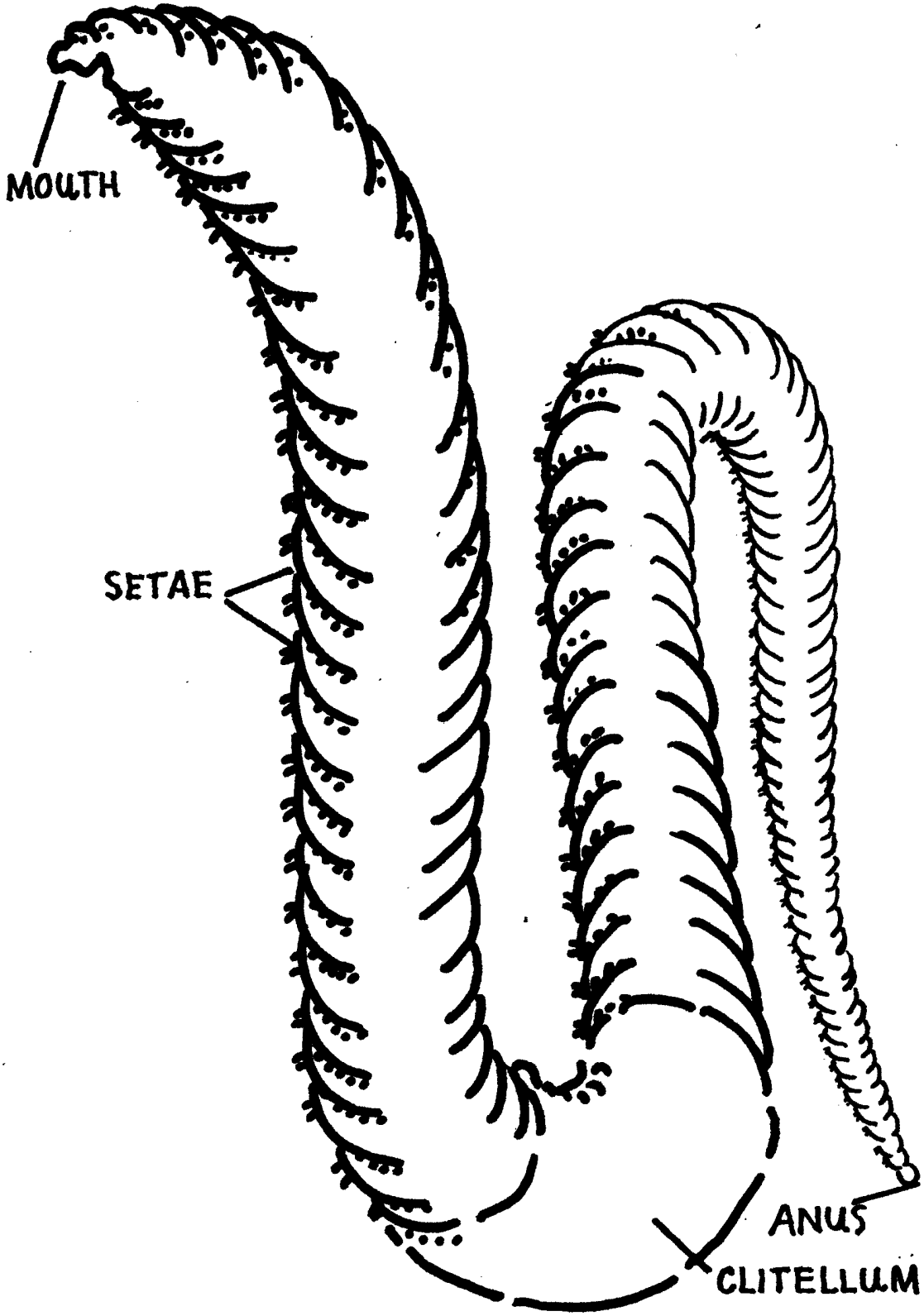
8. After three days unwrap the jars. See what has happened.

Assessment questions:

1. Which jar contained the earthworm? Describe the soil in each jar.
2. Which jar do you think is a better place for a plant to grow?
3. What are the four main parts of the worm?

Resources:
The Big Green Worm Farm (AMS Treasure Chest)
Mini Worm Farm Instruction Booklet (AMS Treasure Chest)

THE OUTSIDE OF A WORM



SOIL
A DIRTY SUBJECT

Grades: K-3
Subjects: Science, Math, and Language Arts
Montana Standards: Science 1, Math 5, and Literature 1
Approximate Time: 2- 45 minute classes and 2 weeks for graph

Objectives: Students will

- Become aware of soil and its importance to plants and animals.
- Know the three layers of soil.
- Become aware of which types of soil are best for growing plants.
- Measure and graph seed growth.

Materials Needed:

- A Handful of Dirt by Raymond Bial
- "Rabbit Maze" handout
- "What Is Soil" handout
- Clay
- Sand
- Potting Soil
- Clear plastic cups for planting
- Cups for edible soil
- Bean seeds
- Measuring spoons
- Water
- Large bowls for mixing pudding and crushing cookies
- 1 large package chocolate crème sandwich cookies
- ¾ package gummi worms
- 1 package miniature chocolate chips
- 4 tablespoons margarine
- 1 8-oz. package cream cheese
- 1 cup powered sugar
- 3 ½ cups milk
- 2 3-oz. packages vanilla instant pudding
- 12 oz. container of whipped cream

Keywords:

Bedrock, subsoil, topsoil, nutrients, organic products, graph

Brief Description:

Read A Handful of Dirt by Raymond Bial

One of the most important natural resources on earth is soil. Many living things depend on soil either directly or indirectly for a food source. The amount of food-producing land dwindles as the world's population continues to grow. Farmers have to produce as much food as possible on every foot available. In order for farmers to be productive, they need to have good, nutrient-rich soil.

There are three main layers of soil. The bedrock layer is the bottom layer, which is about three feet below the surface and has large rocks in it. The subsoil layer is about one foot below the surface. Tree roots and earthworms live here. The topsoil is where the plants grow. This is the layer that must be protected. It is the responsibility of each generation to use the soil wisely. Farmers often have their soil tested to make sure it has the right nutrients. Also, the type of soil a farmer has determines which type of crops can be raised.

Soil is made up of four parts: air, water, minerals, and organic matter. Air and water provide nutrients to the plant so the plant can make food for itself. Organic matter, also known as humus, is made of plant and animal remains in various stages of decay. Minerals are the clay, sand, and silt particles. The mineral content determines the soil type. Sandy soil has mostly sand and no organic matter. Sand is the largest of the soil particles, feels gritty, is the heaviest, and allows water and air to move easily through it. Clay has mostly clay, a little organic matter, and sand. Clay particles are very fine and are the smallest of the three soil particles. Clay is sticky when wet and hard and brick-like when dry. Silt is the soil particle that falls between sand and clay in texture; it is considered a medium-sized soil particle. It feels like flour and is very smooth when you rub in your hands. Silt particles keep the soil rich and loose.

Lesson:

1. Who needs soil?
   Ask students to think of ways that animals and plants use the soil.
   To live in (termites and worms)
   To sleep in (snakes and gophers)
   To store food in (squirrels and chipmunks)
   To get food from (birds, people and worms)
   To hibernate in (turtles, frogs and insects)
   To grow in (plants)
   Hand out and do "Rabbit" maze
2. What is soil?
   Hand out and do "What Is Soil?"
   Make edible soil. As the mixture is put into their cups, talk about each layer and relate that to the actual layer of soil
   a. Crush and set aside one large package of the cookies.
   b. Cream together four tablespoons margarine, one 8-oz. Pkg. Cream cheese and one cup powdered sugar.
   c. Mix together three and one half cups milk, two 3-oz. Pkg. vanilla Instant pudding. Mix well.
   d. Bedrock: Begin with a layer of crushed cookies. Then mix chocolate chips with half of the creamed pudding mixture and smooth it over the cookies.
   e. Subsoil: Add more crushed cookies, then a creamed pudding layer and gummi Worms. (Save one for the top layer.)
   f. Finish with a layer of crushed coolies. Poke a gummi worm through the top to Peek out of your "soil."
3. Which soil is best for crops?
   Plant bean seeds in different soil types.
   a. For this part you will be using clay soil, sandy soil, and potting soil. As a class you will be planting bean seeds in three different soil types to determine which soil is the best to grow plants. Discuss with students that potting soil is a mixture of all types of soil with some humus added to it.
   b. Place some clay soil in one clear, plastic cup. Put some sandy soil in another

and potting soil in the third cup. Label each cup with the types of soil it has in it.

c. Place two bean seeds in each cup. Cover with appropriate soil type.

d. Give each cup a little amount of water. Place each cup next to each other on a window sill.

4. Measure and graph seeds growth.

As a class, measure and graph the growth of the beans.
After one-and-a-half to two weeks, see which plant has grown the most.
Which soil type was the most successful?

Assessment: Questions for understanding

1. What type of soil allows water to run quickly through it?
2. What type of soil is sticky when wet and hard when dry?
3. What is humus or organic matter? How does it benefit soil?
4. Compare and contrast all three types of plant growth.
   Which soil was the worst for growing plants?
   Which soil was the best?
5. What did the three layers of "Edible Soil" represent?

Resources: A Handful of Dirt by Raymond Bial
Agriculture in Montana Schools Teacher's Resource Library
National Wildlife Federation
Montana Dirt Babies (Pattern in AMS Treasure Chest)

WHAT IS SOIL?

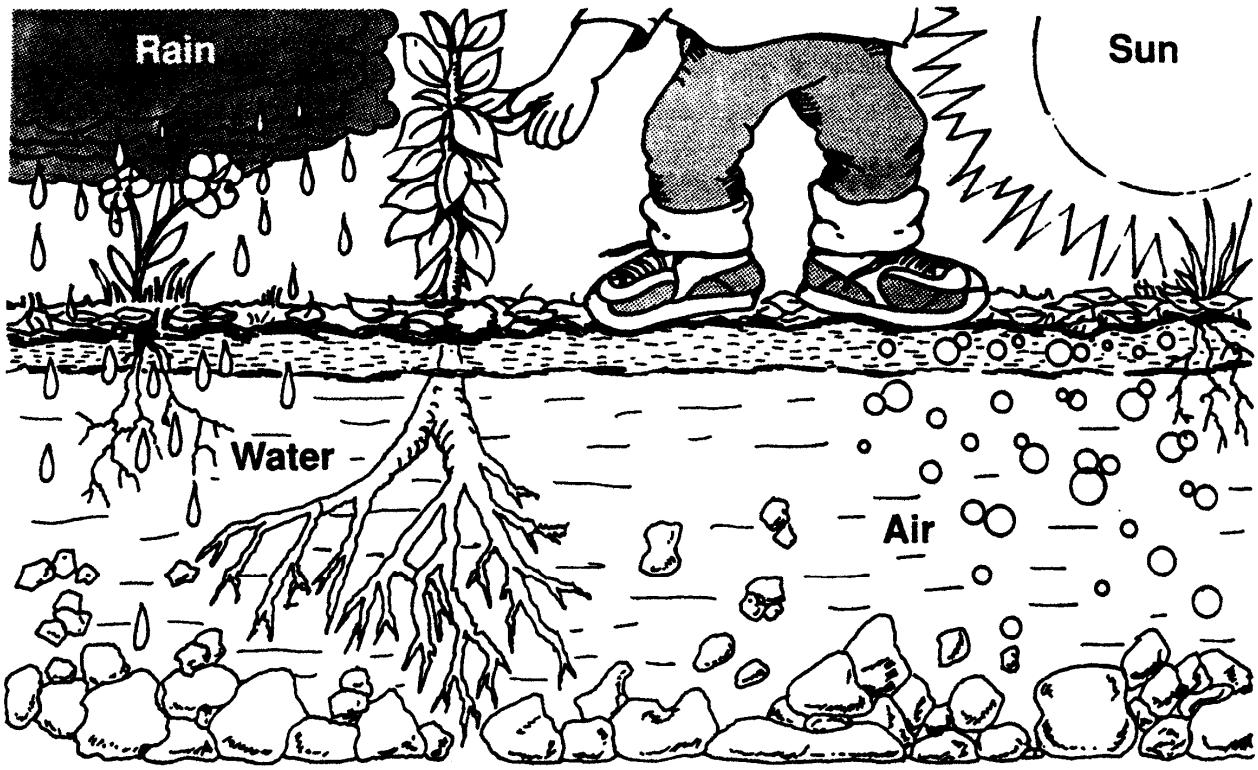
The earth has many rocks. Sun, wind and water break up and wear away rocks. Growing plants may break up rocks too. Small bits of broken rocks mix with dead plants and animals to make soil. It takes a long time to make just a little bit of soil. That's why it is so important to take good care of it.

Soil needs air and water for plants and animals to live and grow in it.
Find these things in this picture:

Roots	**Dead plants**
Water	**and animals**
Air	**Rocks**

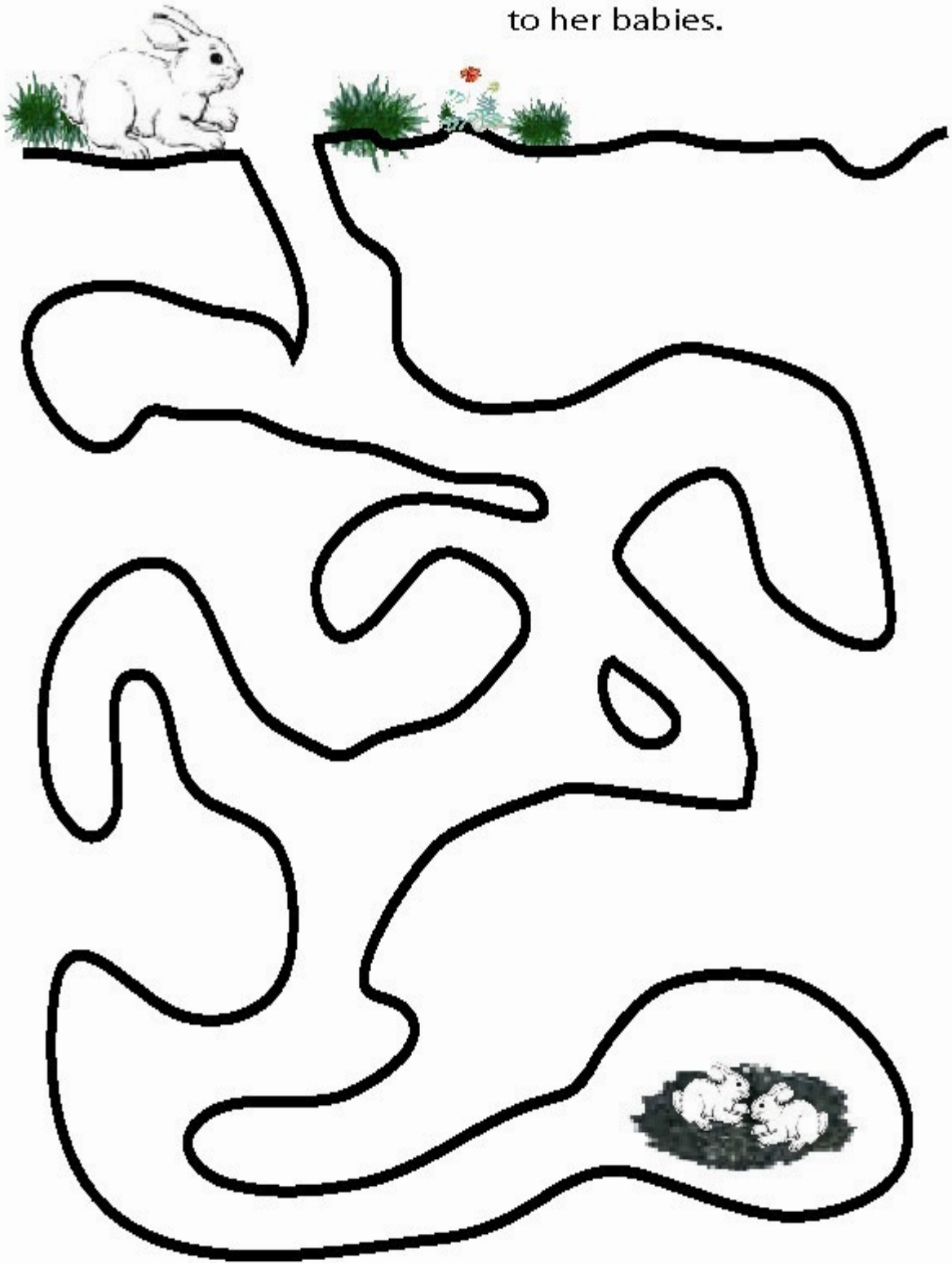
All these things work together to make good soil.

Above the soil



Help mother bunny find her baby bunnies

This is a rabbit's home.
Draw a line from the mother to her babies.



IT'S ALL WATER

Grades: Late 1st -2nd
Subjects: Science
Approximate Time: 1 week
Montana Standards: Science 1, 2, and 4

Objectives: Students will

- Be introduced to and develop some understanding of the water cycle.
- Be able to relate the water cycle to everyday life.
- Be exposed to the terminology associated with the water cycle.

Materials Needed:

- Water and Me in the AMS Treasure Chest

Items needed for Activity 1:

- Follow the Raindrop: The Water Cycle in AMS Resource Library
- Kettle
- Water
- Hot Plate
- 8 ½" x 11" piece of cardboard
- Freezer available
- Booklet prepared from sheets numbered 1-5

Items needed for Activity 2:

- Worksheet 6, enlarged by about 20% to fit on 8 ½ x 14 paper
- Butcher Paper
- Transparency of worksheet 6

Items needed for Activity 3:

- Ice cubes
- Spoons
- Two sets of vocabulary cards
- Tape
- Small buckets for each group
- Copies of Worksheet 7, enlarged by about 20% to fit on 8 ½ x 14 paper, with the vocabulary words deleted from the picture.

Keywords:
water cycle, evaporation, condensation, precipitation, collection

Brief Description:

Precipitation, evaporation, and transpiration are all terms that sound familiar, yet may not mean much to you. They are all part of **the water cycle**, a complex process that not only gives us water to drink, fish to eat, but also weather patterns that help grow our crops.

Water is an integral part of life on this planet. It is an odorless, tasteless, substance that covers more than three-fourths of the Earth's surface. Most of the water on Earth, 97% to be exact,

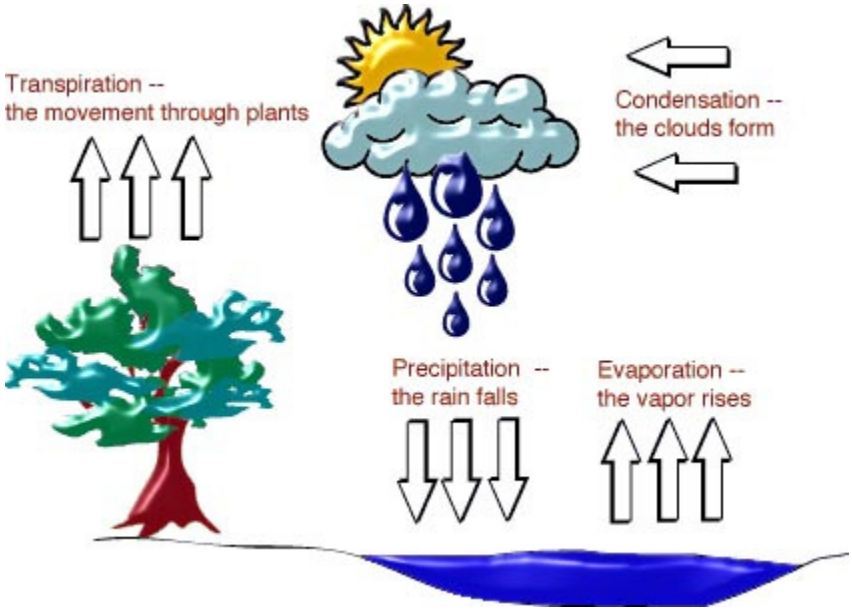
is salt water found in the oceans. We can not drink salt water or use it for crops because of the salt content. We can remove salt from ocean water, but the process is very expensive.

Only about 3% of Earth's water is fresh. Two percent of the Earth's water (about 66% of all fresh water) is in solid form, found in ice caps and glaciers. Because it is frozen and so far away, the fresh water in ice caps is not available for use by people or plants. That leaves about 1% of all the Earth's water in a form useable to humans and land animals. This fresh water is found in lakes, rivers, streams, ponds, and in the ground. (A small amount of water is found as vapor in the atmosphere.)

The Cycle

Water is constantly being cycled between the atmosphere, the ocean and land. This cycling is a very important process that helps sustain life on Earth.

As the water evaporates, vapors rise and condense into clouds. The clouds move over the land, and precipitation falls in the form of rain, ice or snow. The water fills streams and rivers, and eventually flows back into the oceans where evaporation starts the process anew. Learn a lot more about this complicated process in concepts.



Water's state (solid, liquid or gas) is determined mostly by temperature. Although water continuously changes states from solid to liquid to gas, the amount of water on Earth remains constant. There is as much water now as there was hundreds of millions of years ago.

Through activity one the children will observe the water cycle. By the making and coloring of their booklet they will become more familiar with the terminology and understanding of the water cycle.
Through activity two the students will review and discuss the water cycle using worksheet number 6 taken from Water and Me.

Through activity three the children will exhibit their understanding of the water cycle and the terminology associated with the water cycle by participating in the Water Cycle Relay Race.

Lesson 1: Read and discuss the book Follow the Raindrop: The Water Cycle. Be sure to thoroughly discuss the terminology listed in the keywords above. Do the activities on pages 1-5 of the water cycle booklet. Each sheet of the water cycle booklet describes an activity to further explain each step of the water cycle. Teacher should show an overhead of each page of the booklet as they do the activity associated with each step of the cycle. Students and teacher will review the pages of the booklet. They will sequence the pages as a group. Lastly, the pages will be colored by the students. This lesson may be done over several days.
Lesson 2: The teacher will lead a discussion on the water cycle, in the real life situation, as portrayed in the picture of worksheet 6. As children color their individual scene portraying the water cycle, several students will be at a table coloring the large mural of the same scene. This mural will have been previously traced from a transparency by the teacher.
Lesson3: Water Cycle Relay

Lesson:

1. Divide the class into teams. Teacher must supply a picture for each team and a set of vocabulary cards for each team. Show them the Water Cycle, pointing out the missing vocabulary words that describe the steps in the cycle. Explain that they will fill in these blanks with the missing words in the course of a Water Cycle relay Race.
2. Pass out a spoon and ice cubes to each group. As part of the relay, each group will place an ice cube on the spoon and pass both from the back of the line to the front of the line. Let the groups practice passing the spoon with the ice cube on it.
3. Next, give each team a set of the vocabulary words in a bucket. The first person in each line will draw a card from the bucket and attach a piece of tape to it. The first person takes the card to the last person in line; that is holding a spoon with an ice cube. They discuss the vocabulary word and its meaning. The spoon and cube along with the vocabulary card are passed to the next person in line, discussing the word with each student as it is passed to the front of the line. When the vocabulary word and spoon and cube reach the front of the line, that person will carry everything to the poster and tape the vocabulary word in the appropriate space. That same person will then go to the bucket to draw out a new vocabulary word and take it to the last person in line to discuss the vocabulary word before passing the spoon and cube as well as the vocabulary word to the next person in line. And continue on until the picture is filled with the vocabulary words from the bucket. At the end of the race the class will discuss the correctness of the poster as well as which team have the most correct answers and finished first. A good discussion at the end of the race would include what happened to the ice cube during the relay.

Assessment:

The accuracy of the students when filling out the poster during the Water Cycle Rely Race.

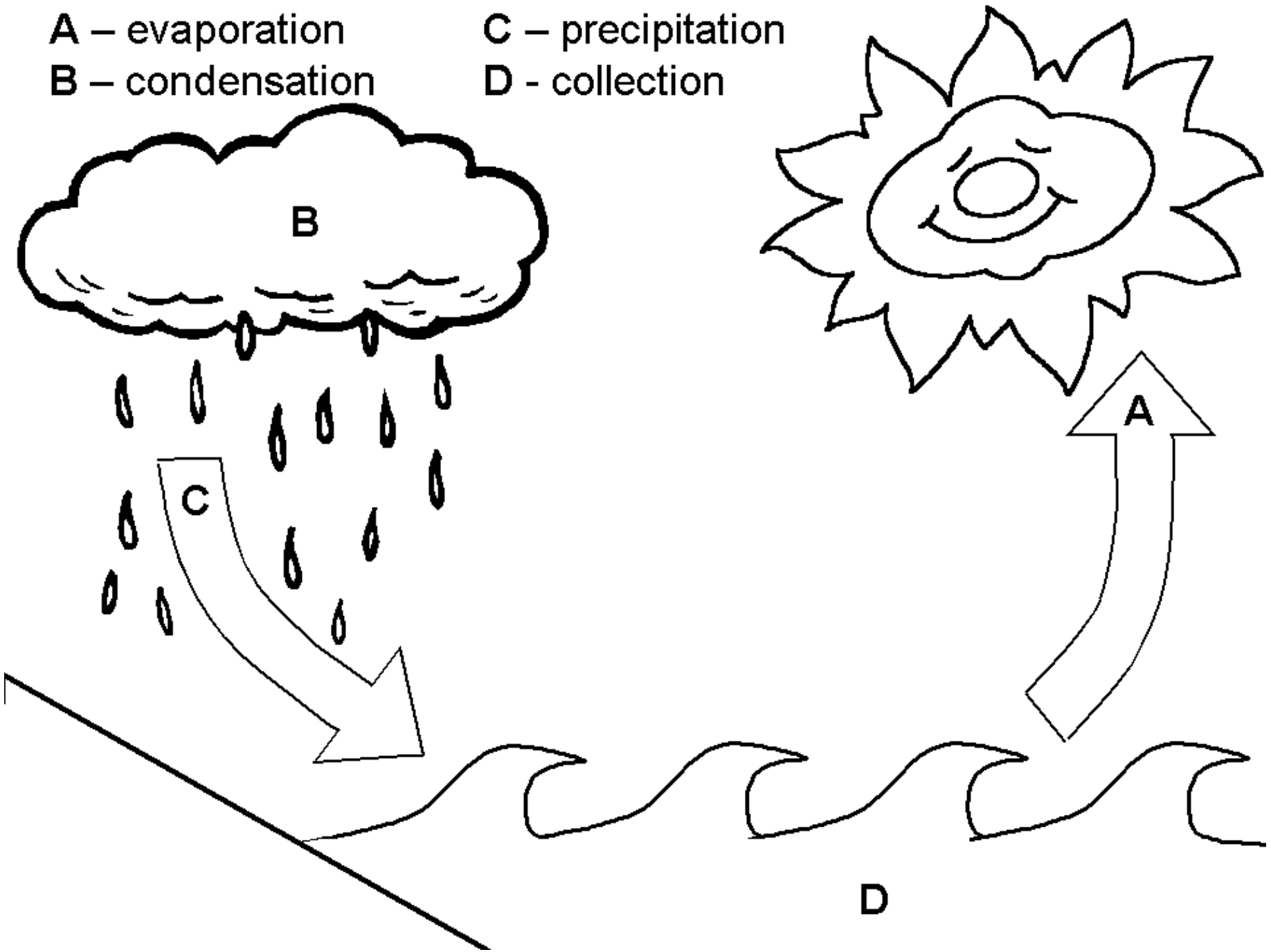
Resources:

www.enchantedlearning.com/subjects/astronomy/planets/earth/Watercycle.shtml
www.kidzone.ws/water/

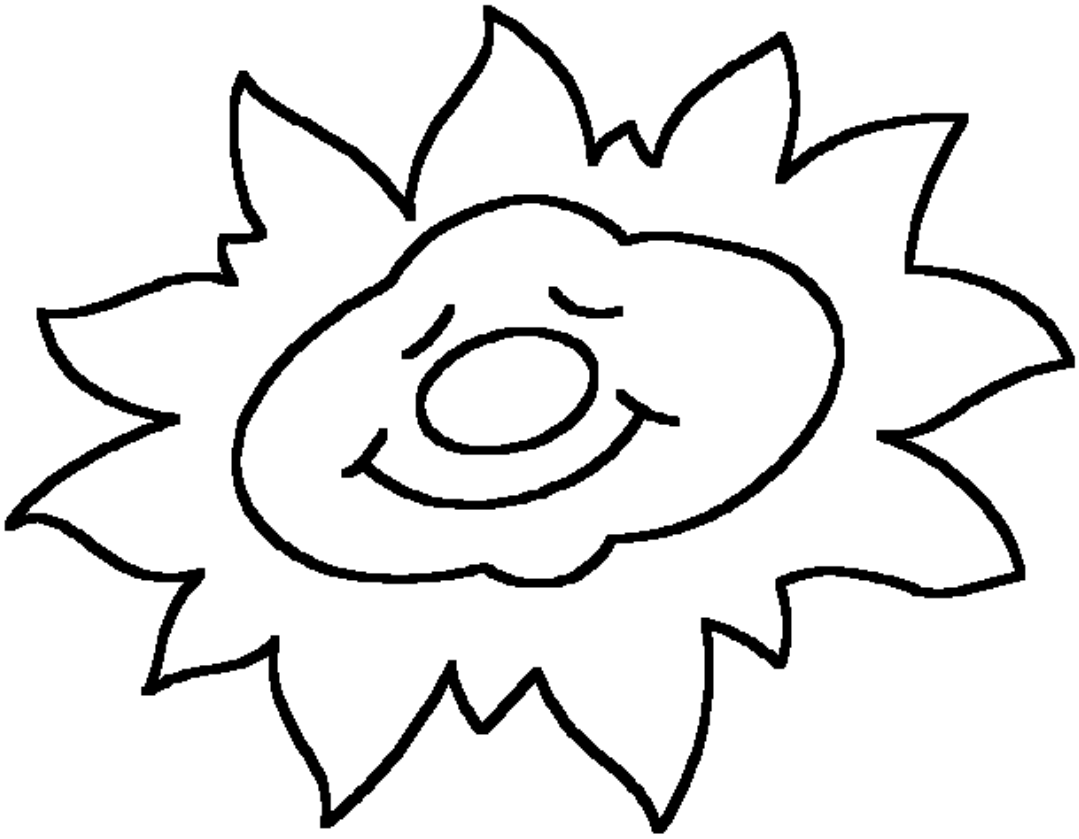
Vocabulary Cards for the Relay Race

Water Cycle	**Collection**
Evaporation	**Recreation**
Condensation	**Plants**
Precipitation	**Wildlife**
Sun	**Homes**
Clouds	**People**

A – evaporation
B – condensation
C – precipitation
D - collection

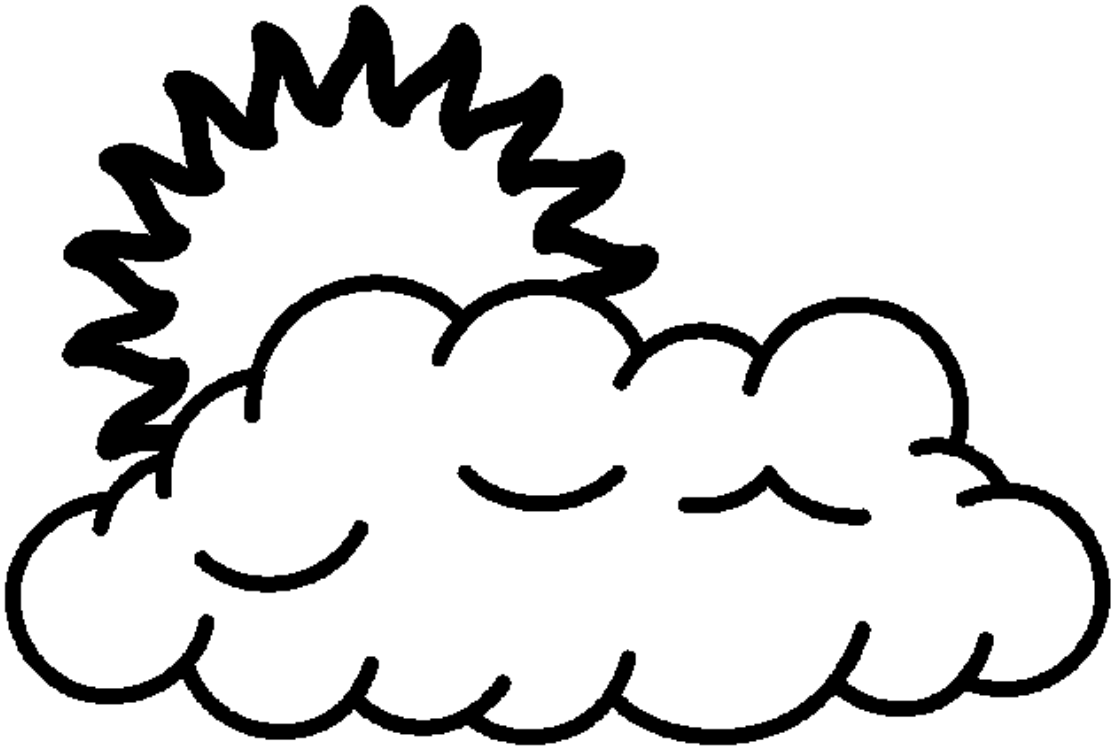


Evaporation



Evaporation is when the sun heats up water in rivers or lakes or the ocean and turns it into vapor or steam. The water vapor or steam leaves the river, lake or ocean and goes into the air. Make your own evaporation. With an adult's help, heat some water in a kettle. Watch closely! Do you see the steam rising? That's evaporation!

Condensation



Water vapor in the air gets cold and changes back into liquid, forming clouds. This is called condensation.

To see condensation in action, put a large (at least 8 ½ x 11) piece of cardboard (a book will work) in the freezer for about an hour. Now, take the boiling kettle of water and hold the cold book about 1 foot over the spout (right in the steam… wear oven mitts). Water droplets will form on the book. That's condensation!

Precipitation

Precipitation occurs when so much water has condensed that the air cannot hold it anymore. The clouds get heavy and water falls back to the earth in the form of rain, hail or snow.

If you continue the condensation experiment long enough, so much water will condense on the book that it won't be able to hold it all. At that point, water will start dripping down from the book and you've created precipitation!

Collection

When water falls back to earth as precipitation, it may fall back in the oceans, lakes or rivers or it may end up on land. When it ends up on land, it will either soak into the earth and become part of the "ground water" that plants and animals use to drink or it may run over the soil and collect in the oceans, lakes or rivers where the cycle starts all over again.

SNOW TRANSFORMATION

Grades: Late 2 & 3
Subjects: Science & Math
Approximate Time: 20 minutes
Montana Standards: Science 2,3 & Math 2,5

Objectives: Students will

- Observe and measure the conversion of snow to water.

Materials Needed:

- Clear quart containers with lids
- Rulers
- Rubber bands
- Scale

Keywords:

Prediction, conversion, melt

Brief Description:

This activity is done during a snowfall. All the materials should be kept in containers or plastic bags in the freezer or outdoors at least two hours prior to the actual collection.

Lesson:

4. Ask the students what they think makes up snow. How might they prove it? Explain that they will do a simple experiment to find out this and other important things about snow.
5. Divide the class into pairs. Have the students weigh their empty quart containers and record the weights.
6. Have the students collect the cleanest snow they can find. Weigh the snow-filled containers. Record the weight. Have the students subtract the weight of the empty containers from the weight of the snow-filled container to find the weight of the snow itself.
7. Tape the ruler vertically to the side of the jar. Ask students how high they think the water will be when the snow melts. Have them mark their predictions on the ruler. (For younger students, place rubber bands around the jar instead of the ruler to mark each student's predictions.)
8. Have the students cover the containers, set them aside, and record the time. Ask them to predict how long it will take for all of the snow to melt. Will the melted snow weigh more or less or the same as the unmelted snow? Record predictions.
9. Have the students check the container periodically until all of the snow has melted and record the time.
10. Have the students record the weight and water levels of the melted snow in the containers. Did the weight of the snow change after it melted. (It should be the same.)
11. Have the students compare the results to their predictions. Discuss differences and possible explanations. (The water level of the melted snow will be less than that of the snow because of the volume of the air spaces between the snow crystals.)
12. Have the students share their results.

Resources:

Parrella, Deborah. Project Season. Hands-on activities for discovering the wonders of the world. Shelburne Farms. 1995.

FARMER'S HATS

Grades: K-3
Subjects: Careers
Approximate Time: 30 minutes (may vary)
Montana Standards: Careers 1, 4, 5

Objectives: Students will

- Explain how farmers must "wear many different" hats each day.

Materials Needed:

- Worksheets
- Crayons
- Brass fasteners
- scissors

Keywords:

Veterinarian, engineer, mechanic, manager, conservationist, nutritionist, forester, erosion, pollution, meteorologist, agronomist, diversify

Brief Description:

Farming is an occupation—a way of earning money—that requires the farmer to do many different jobs during a year, and even during a day. In some lines of work, people do the same tasks every day. For occupation, the tasks can be very different from one day to the next, or from one season to the next. Agriculture, or farming, is like that. Farmers must do many different tasks. We call that "wearing a lot of hats".

Lesson:

1. Photocopy the two worksheet pages for each student. (Don't copy front to back.)
2. Students may chose a male or female and discard the other.
3. Have the students cut out the two larger circles and one of the two farmer circles.
4. Fasten them in the center with a brass fastener.
5. Make sure the largest circle is on the bottom and the smallest is on top.
6. The students should be able to spin all three circles separately. Ask the students to find a hat on the middle circle and put it on the farmer's head, and then try to find the words that best describe what the farmer does when wearing that hat.

Extended Lesson:

Invite agriculturally related speakers to tell students about their jobs and the many "hats" they wear.

Discussion:

1. Why is it important for a farmer to have a basic understanding of all these careers?
2. What other job skills must a farmer use?
3. Do you know people in your community who specialize in any of these career areas?
4. Which of the jobs a farmer does is your favorite? Least favorite?
5. Which jobs are the hardest?
6. What other jobs can you think of require people to wear so many different hats?

Resources:

Alaska Agriculture in the Classroom, through the Alaska Division of Agriculture and the Alaska Farm Bureau.

Adapted from Utah Agriculture in the Classroom

Answer key for hats:

Veterinarian—Must recognize early signs of disease in animals; assist at birth of animals, administer medicine to sick animals; care for wounds and injuries.

Engineer—Must know how to plan and construct fences and buildings; build irrigation ditches and control the flow of water; design animal waste systems.

Mechanic—Must operate and maintain both simple and complicated machinery; make repairs and keep machines in good working order.

Business Manager—Must balance accounts; develop marketing strategy; sell farm produce to the market; make payments and meet payrolls; keep track of equipment, products and land.

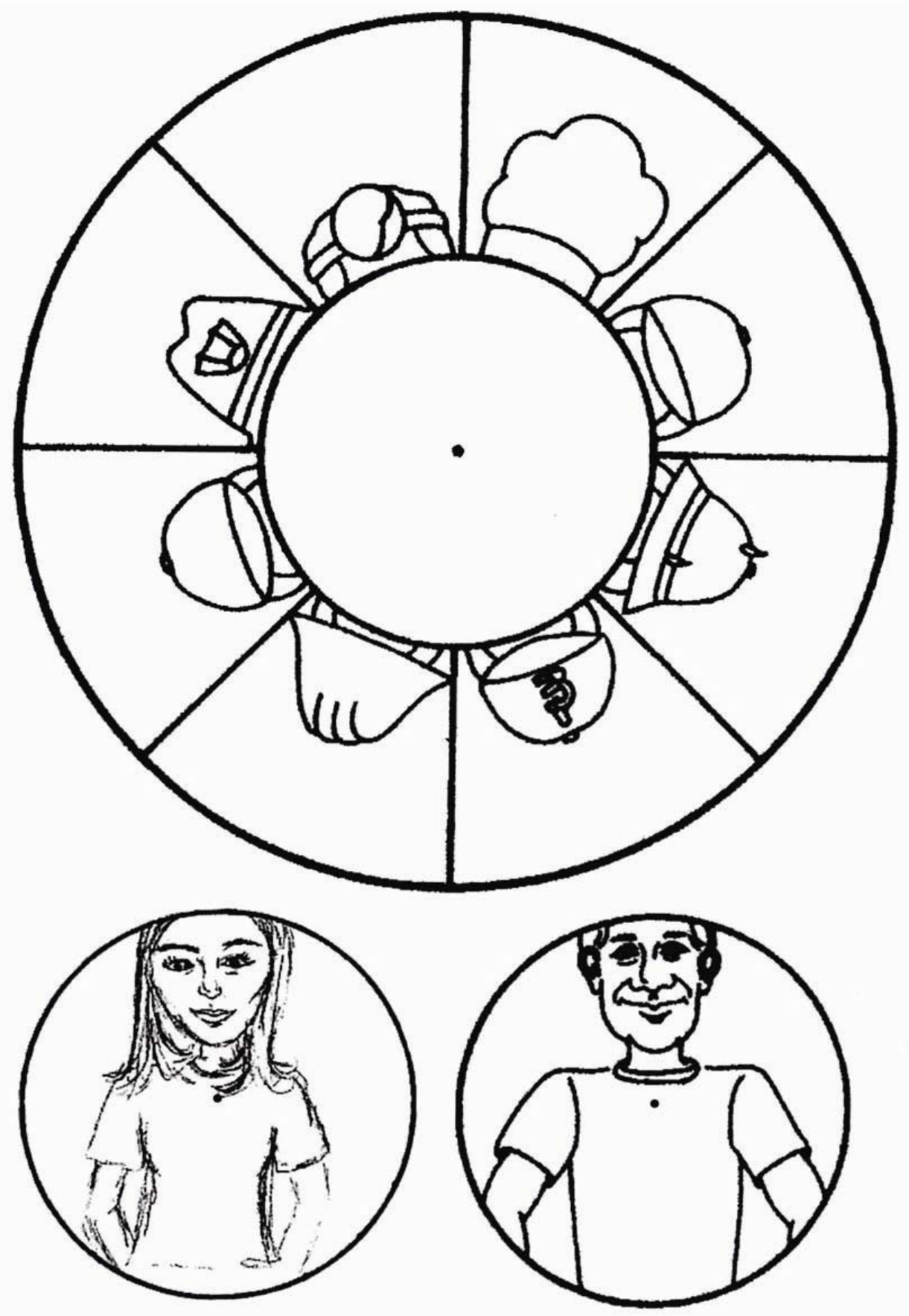
Nutritionist—Must prepare feed rations for best growth and production of livestock.

Resource Conservationist—Must recognize kinds of trees; manage woodlots; detect fires and know the methods for controlling them; prevent soil erosion; protect water quality.

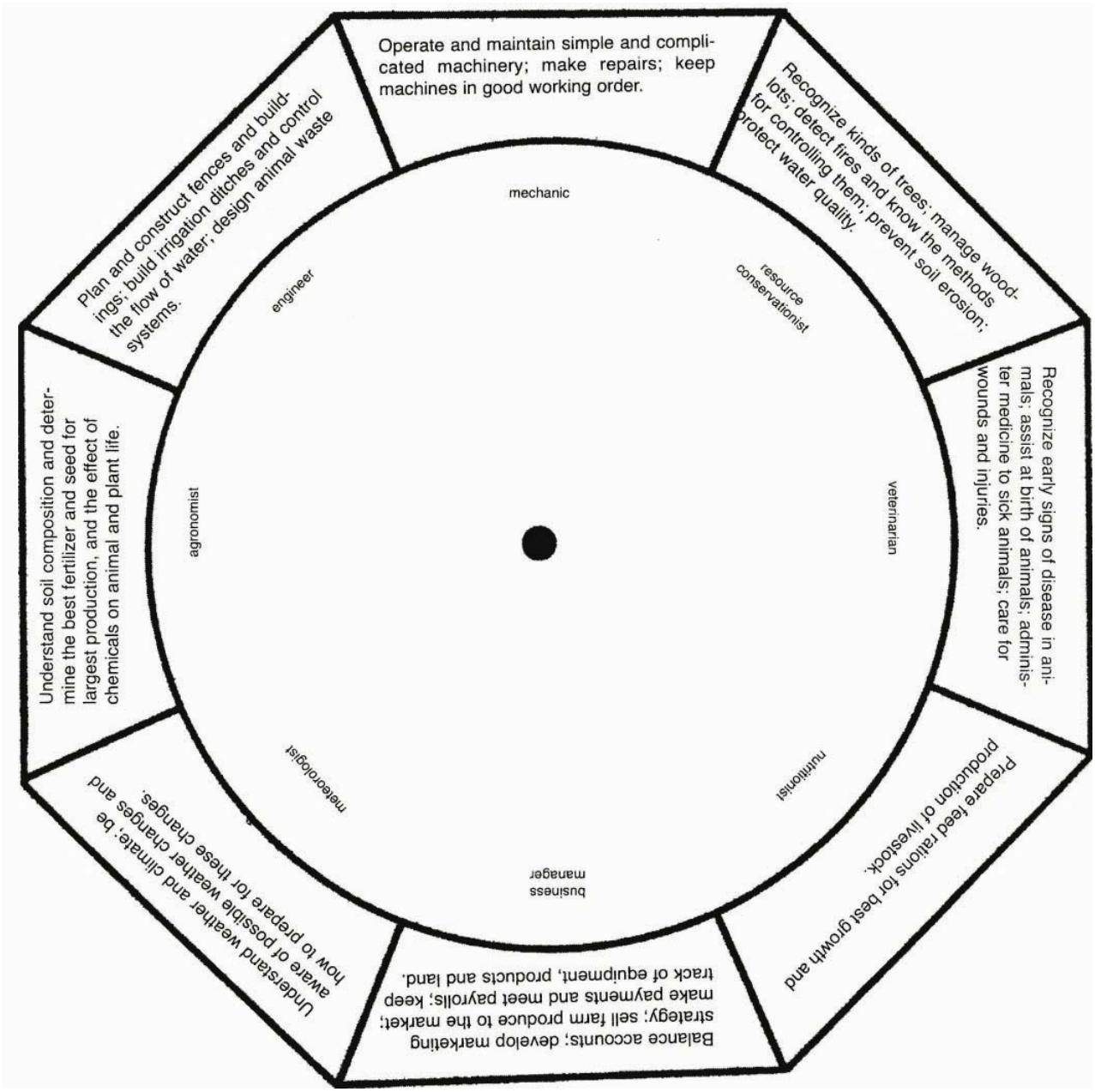
Agronomist—Must understand soil composition and determine the best fertilizer and seed for largest production; the effect of chemicals on animal and plant life.

Meteorologist—Must understand weather and climate; be aware of possible weather changes and how to prepare for these changes.

Many Roles of a Farmer



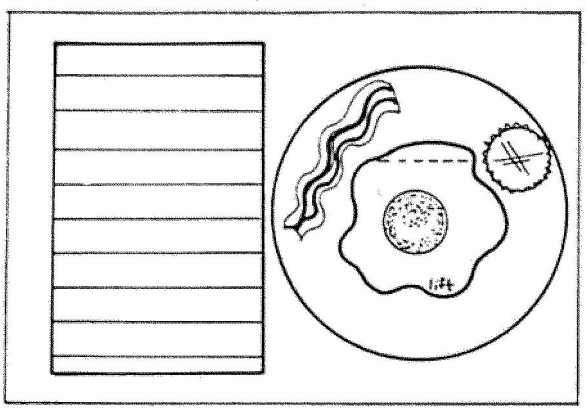
Many Roles of a Farmer



Appendix A

(Chicken Worksheets)

Sunny Side Up



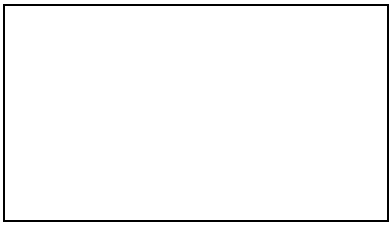
Writing Suggestions

1. I found _____
   _____
   under my breakfast egg.

2. Virgil's family is somewhat unusual. on birthdays they hide a surprise under his breakfast. What did he find this year?

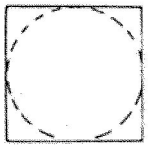
3. <u>How to Fry an Egg</u>
   Tell how you would do it. What might You really find under an egg on your plate?

Steps

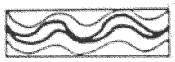


1. Begin with orange construction paper for the background.

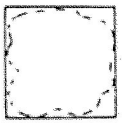
2. Cut from scraps of construction paper:



A blue plate



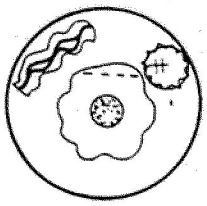
Brown bacon



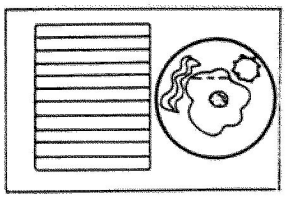
A white egg
A yellow yolk

A brown muffin

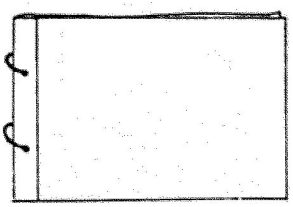
3. Fold back the top of the fried egg. Paste the yolk in the center. Paste the rest of the "meal" on the plate. Add details with crayons or felt pen



4. Paste the plate to the right side of the orange paper. Paste completed stories on the left side.



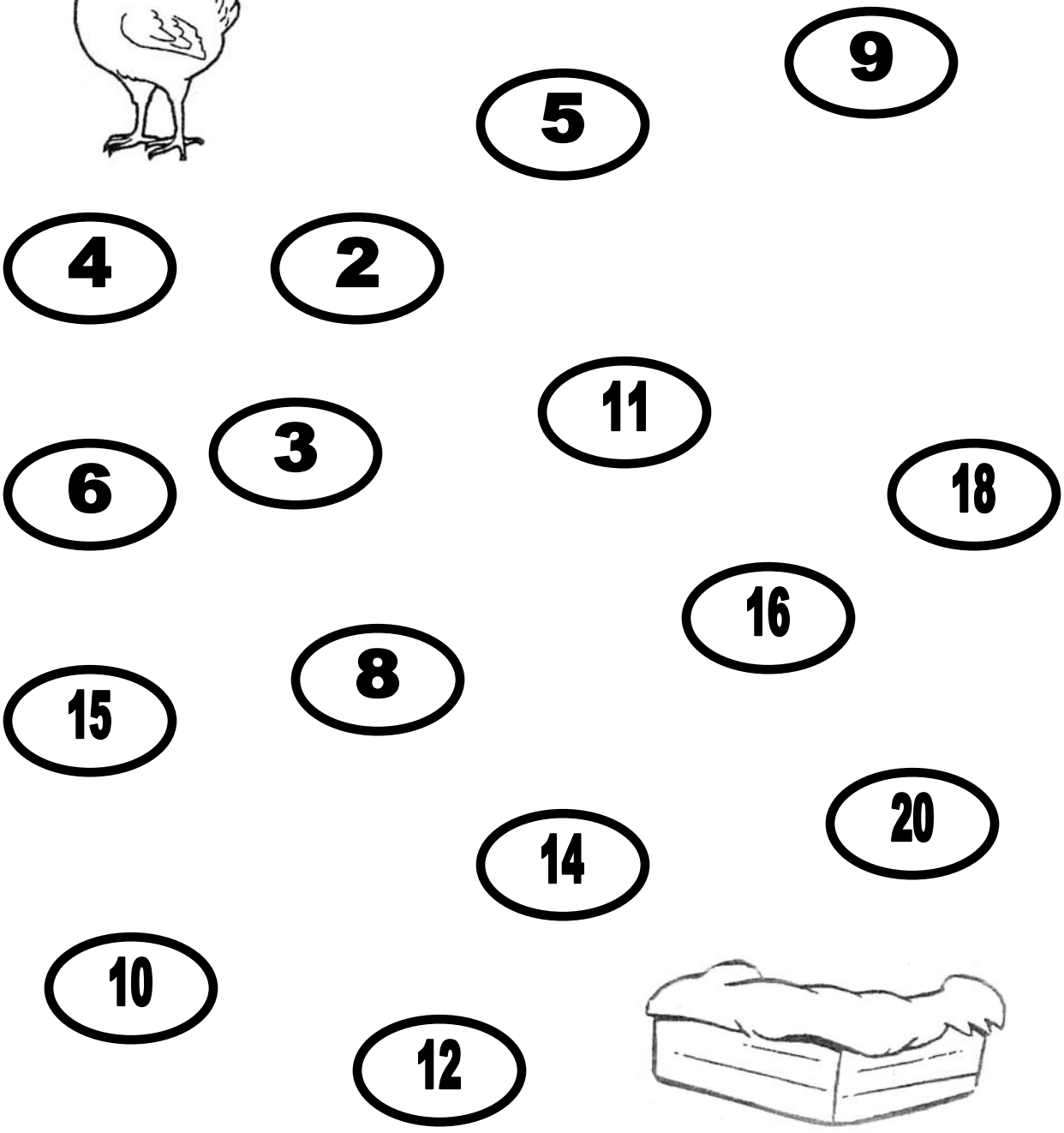
5. Collect pages from several students. Add a cover and punch two holes. Hold it all together with binder rings.



Name _____

Egg Maze: Counting by Twos

Help the hen get her nest by finding the path that counts by twos. Draw a line to connect the path.



Name _____

Egg Maze: Counting by Threes

Help the hen get her nest by finding the path that counts by threes. Draw a line to connect the path.

9

6

3

4

15

0

2

12

9

18

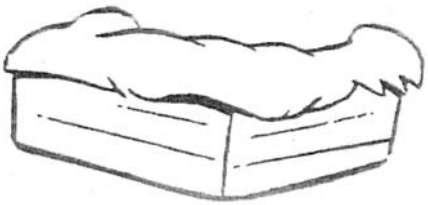
1

5

27

21

24



Name _____

Egg Maze: Counting by Fives

Help the hen get her nest by finding the path that counts by fives. Draw a line to connect the path.

10

25

5

30

30

3

10

45

35

25

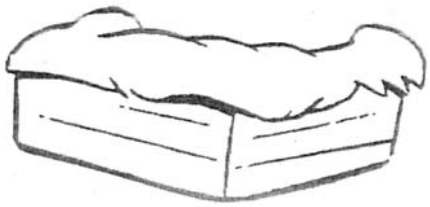
15

50

40

20

45



What's Going On In There?